Botanical Studies on Ragwort.

A. L. POOLE, Botany Section, Plant Research Bureau.

WITH the commencement of intensive study on ragwort about the beginning of 1937, Ruakura Farm of Instruction, at Hamilton, was chosen as the most suitable centre for various aspects of research, including a number of experiments of a botanical nature. Working from this centre, observations have been made on the weed over numerous areas of the South Auckland Province, and experiments commenced at Ruakura, the Mamaku State Farm, Putaruru, and Arohena, about ten miles south of Arapuni. Some of these experiments have reached a conclusive stage, while from others it is possible to draw preliminary results.

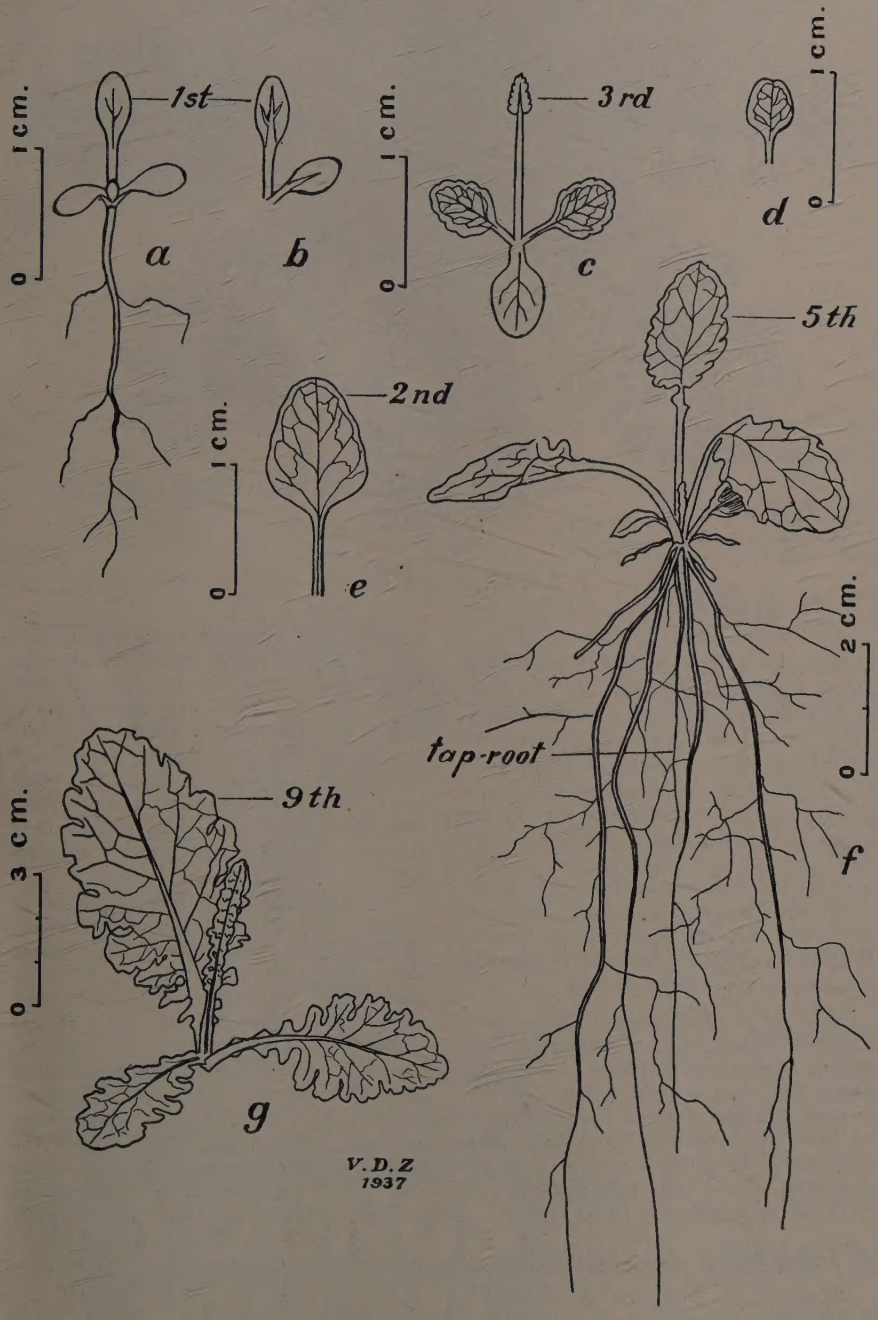

FIG. 1.—Cotyledonary and juvenile stages.

The present article deals with a botanical description of the plant, including its life-history as far as it is known. The rooting-habit and production and germination of seed, because of their extreme importance in the ragwort-plant, are dealt with in separate sections. Finally, results of experiments on the hand control of the plant are given.

Description of the Plant.

Commencing the life-history with the shedding of the seed, we find that some is shed as early as the end of December, but the main fall is in March and April. Field observations have shown that the maximum germination takes place shortly after this, in April to May. The early stages of growth are shown in Figs. 1 and 2; the cotyledons or "seed" leaves are $\frac{1}{5}$ in. to $\frac{3}{10}$ in. long, reaching $\frac{2}{5}$ in. before the first leaf appears. Each cotyledon is thickish, shortly stalked, ovate or slightly obovate (Figs. 1A to 1D), with a broad flattened or shallowly indented tip. The first true leaf appears about a month after germination, and only a few further leaves develop in the winter months. By mid-December small rosettes have formed and many carry through in this rosette stage till next flowering season, though some plants may produce flowering stems in the same season.

For the adult plant the following description applies to normal plants whose growth has not been interfered with; the results of interference are discussed later in the article.

Ragwort is a perennial or biennial herb arising from a stout rootstock from which are developed numerous rather fleshy roots, reaching to a depth of 5 in. or more (Fig. 4). The whole rooting-habit is of such importance from the point of view of control that it is later described in some detail.

The stems are stout, upright, with few or no branches below, averaging about 2 ft. 6 in. in height. The lower leaves (Fig. 2) form a rosette, but have died down by the time flowering is well under

way. These leaves are stalked, dark green above and paler below, cut into numerous segments, and have short sparse hairs or are almost hairless. The stem leaves are often more finely cut, and partially clasp the stem at the base (Fig. 3A).

The flowering portion (Fig. 12) is much branched, the numerous flowers forming a more or less flat-topped cluster. The individual flower-heads (Fig. 3) are about $\frac{3}{4}$ in. in diameter, bright yellow, with twelve to fifteen conspicuous rays. The seeds (Figs. 3A, 3B) are produced in great abundance. They are almost $\frac{1}{10}$ in. long, and about $\frac{1}{50}$ in. wide, with about eight fine longitudinal ridges. The inner seeds (Fig. 3A) carry a row of very short hairs on each ridge, but the seeds of the outermost row (Fig. 3B) lack these hairs. All the seeds are tipped with numerous fine hairs (the "pappus") about $\frac{1}{5}$ in. long. This pappus helps the dispersal of the seeds by wind.

Rooting-habit.

As a basis for various experiments, more particularly those on the chemical control of the plant, it has been necessary to study in detail the nature of the roots and the habit of the rooting-system. The individual roots are soft and rather fleshy (Fig. 5), running more or less straight or in a slightly wavy direction through the soil. They are white, with an average thickness of $\frac{1}{10}$ in. to $\frac{1}{15}$ in., and at comparatively wide intervals very fine, short branch roots are given off. With regard to the root-system, the following description refers to plants up to the rosette stage growing in good cow-grazed pastures dominated by white clover and perennial rye (Figs. 4 and 5). The formation of the crown begins at an early stage, when the top is about 2 in. in diameter, and commences from a thickening of the top portion of the first root. If the plant grows uninterfered with, a single crown is formed, generally about $\frac{1}{2}$ in. to 1 in. in diameter, and about the same in depth. From the sides of this crown the root system is given off. For an average sized rosette (12 in. to 15 in. diameter) this consists of about fifty to one hundred roots, which pass in a vertical direction through the main mat of pasture roots, and then, if long enough, the majority of them run horizontally underneath this mat at a depth of about 4 in. to 5 in. (Fig. 4). Some of the roots extend for 3 in. to 4 in., or a much greater distance in a very loose soil, beyond the area covered by the leaves. Plants more than one season old possess large multiple crowns from which anything up to six hundred to seven hundred roots may be given off.

The propagating powers of ragwort roots are highly developed (Fig. 6), and root cuttings, with or without a portion of the crown, may be induced, in a greenhouse, to form buds and send forth shoots in about a month. In the field, given suitable conditions of moisture and light, very small portions of root will send forth shoots, and it is common in turnip or other crops where ragwort is present to find that the majority of the plants are from shoots springing from roots cut up by the plough. In this way the farmer increases instead of eradicating the plant by ploughing. If land is ploughed with the object of eradicating the plant, it must be followed by summer cultivation and not by a crop.

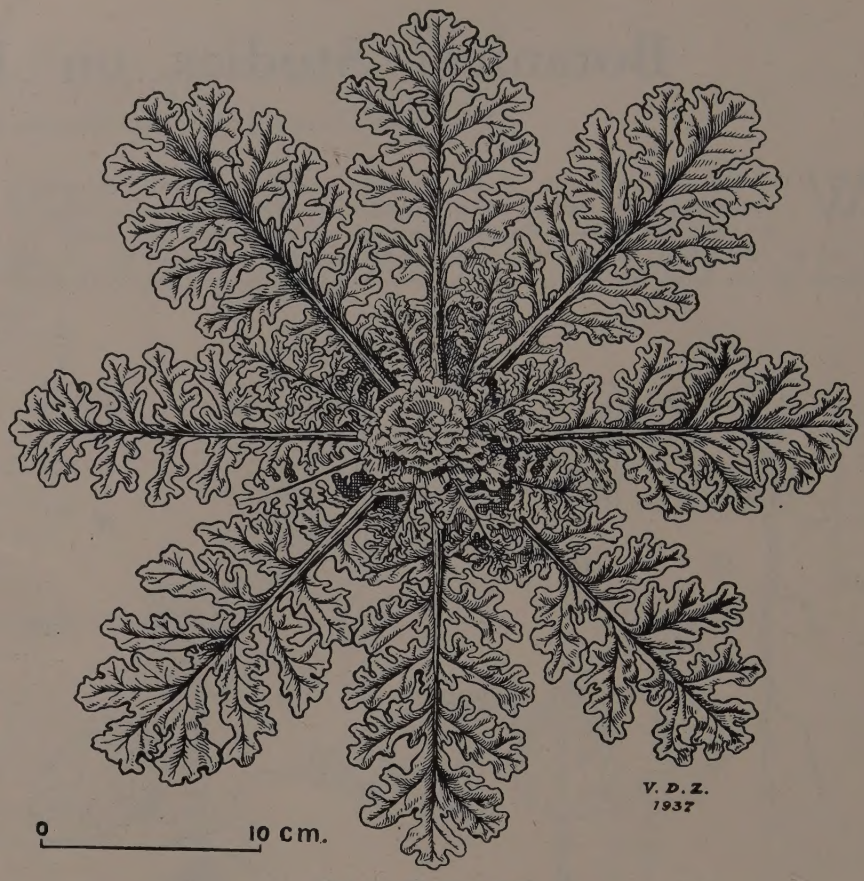

FIG. 2.—Rosette stage.

Thus we see that ragwort possesses a root-system composed of numerous long, rather fleshy roots, which chiefly run under the main mat of pasture roots—a very difficult position from the point of view of eradication—and that these roots are very prone to vegetative propagation. These facts help to make ragwort the aggressive weed that it is.

Production and Germination of Seed.

Other points that add materially to its aggressive nature are the large production of seed, and the high germinating-capacity under suitable conditions of this seed. Average plants examined at Ruakura had from 1,000 to 2,500 flower-heads, and each head averaged 55 seeds, giving an approximate range of 50,000 to 150,000 seeds per plant. Cameron,* working on ragwort in England, gives much the same figures as these. Ragwort growing on poor country form less vigorous plants and produces much less seed.

The germination of these seeds varies considerably under different conditions. In the laboratory sound seeds have given from 50 per cent. to 86 per cent. germination, while on cultivated plots, sown each month since March, 1937, it has varied from 5 per cent. to 34 per cent. On these plots germination has taken place throughout the autumn, winter, and spring. The maximum germination, however, takes place shortly after the seed is sown, no matter what time of the year; but under natural conditions, as stated previously, germination takes place in April and May, shortly after the major fall of seed. The most rapid germination

* Cameron, Ewen (1935): "A Study of the Natural Control of Ragwort (*Senecio Jacobaea* L.)." *The Journal of Ecology*, Vol. XXIII, No. 2, Aug., 1935, p. 275.

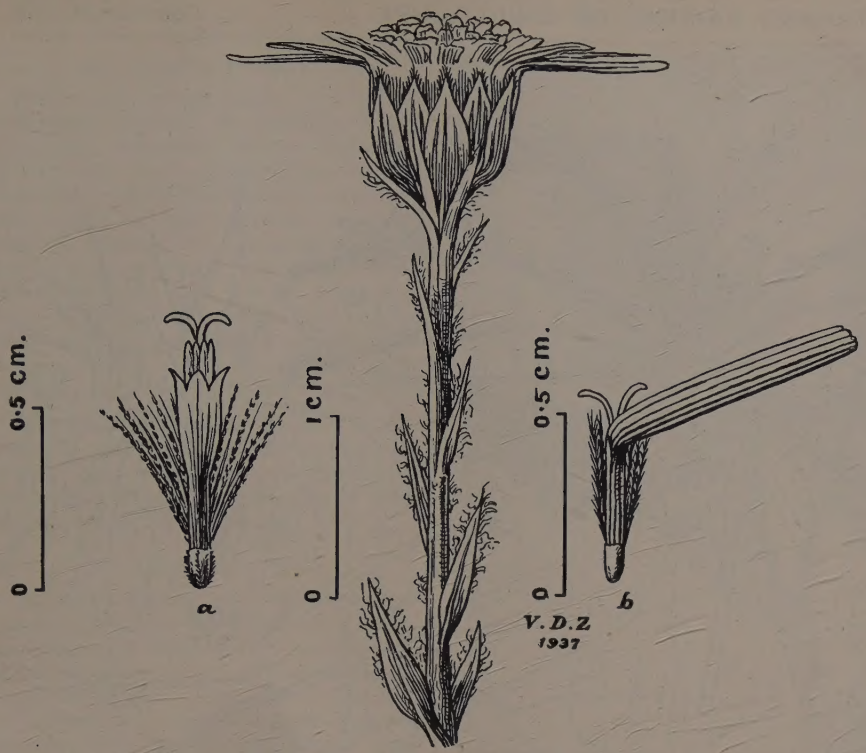

FIG. 3.—Flower-head, ray, and disk florets, showing seed.

comes from seed just covered with soil. Under greenhouse conditions the first cotyledons appear in from four to five days, while outside the first appear in from three to four weeks. It has been found that a covering of ½ in. of light soil is sufficient to prevent germination, while seeds on the surface of the soil germinate more slowly than those just covered, but they eventually show approximately the same percentage.

Experiments on the all-important phase of the establishment of plants in pasture land are under way, the following being some preliminary observations from them. Seed will germinate readily in very open pastures, but on the bare spaces the young plants die off during the hot weather, and only those under the shade of grass or clover survive. In pastures of good density germination has varied from 1 per cent. to 10 per cent.; but the ultimate survival of seedlings is much lower, and on plots that have been sown for six months or more the average is approximately 1 per cent. Plants that germinate in these pastures develop very slowly, remaining in the cotyledon stage for one or two months, and at the end of three or four months have only two

Jason finds the Golden Fleece

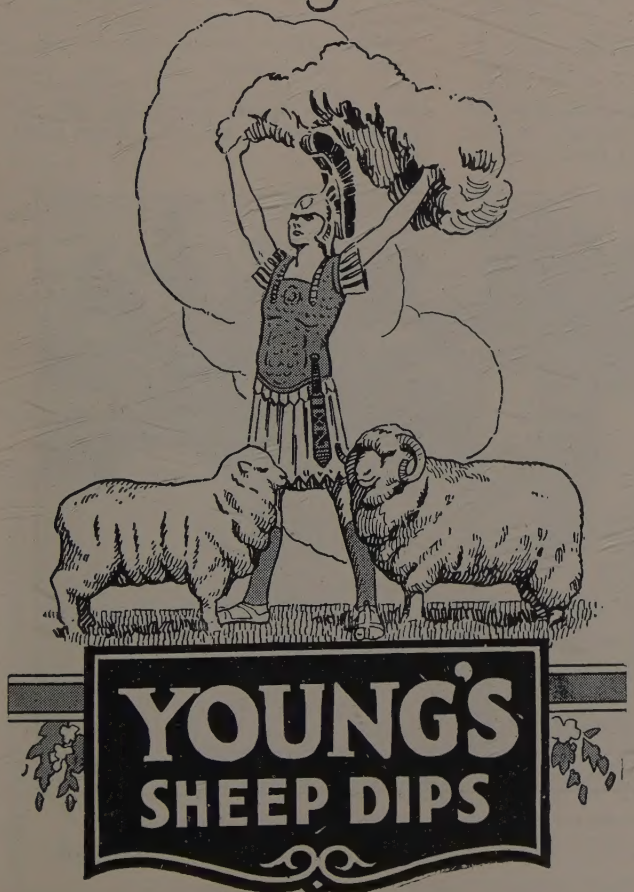

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FIG. 4.—Root-system in turf.

or three leaves not more than ½ in. long. It is thus seen that the plant becomes established only with difficulty in good pasture land.

Experiments on Hand Control of Plant.

Most of the following experiments are similar to various methods of control now in use :—

(*a*) *Chipping Plants.*

Twenty rosette plants from 9 in. to 12 in. in diameter growing in a good pasture of perennial rye and white clover at Mamaku were chipped or spudded at the end of February, 1937. By the beginning of April sixteen of these were showing new shoots from the ends of the cut roots (Fig. 7). Plants were lifted and examined from time to time, and all showed the production of healthy new shoots from the roots, one plant having twenty-five shooting roots. During the winter the shoots from each chipped plant could be seen forming small rosettes 2 in. to 3 in. in diameter in the pasture (Fig. 8), and by the spring all plants not lifted were showing a strong regrowth.

It is thus seen that chipping or spudding plants increases their strength, in that new shoots are given off from each cut root. These would eventually join to form a multiple crown and a larger plant than before.

FIG. 5.—Showing the rather fleshy nature of the roots of a rosette.

[*Photo by H. Drake.*

(*b*) *Deflowering Plants.*

Five plants in full flower in a good cow-grazed pasture at Ruakura were completely deflowered at the beginning of February, 1937. They all developed fresh crops of flowers, which were removed each month for four consecutive months (Fig. 9). During the winter months no flowers were produced, but some of the plants produced new rosettes from the base of the old flowering stem while some of the plants died down. By August all plants were showing new shoots from the old crowns or roots.

Deflowering plants is therefore of no practical value, as it stimulates them to produce fresh crops, and even continuous deflowering throughout the season does not ultimately kill the plant.

(*c*) *Cutting down Plants.*

At the beginning of February, 1937, ragwort-plants in full flower in a dense perennial-rye - white-clover pasture at Ruakura were cut at different heights from the ground; six plants were cut at a height of 1 ft., six at 6 in., and six at 2 in. from the ground. Plants were examined monthly and cut back to the required height for the first four months, but thereafter were allowed to develop normally. The following summarizes the behaviour of these plants :—

Plants cut at a Height of 1 ft.—All plants showed strong regrowth and new flower-buds until May. During the winter months they showed considerable differences in the vigour of growth. By the spring all plants were still living, three having strong rosettes up to 15 in. diameter and the other two showing new regrowth from the old crown and roots.

Plants cut at a Height of 6 in.—All plants showed strong regrowth and new flower-buds until May. During the winter they remained alive in the rosette stage, and by the spring all plants were still living, the largest being a strong rosette of 18 in. diameter.

FIG. 6.—Roots show very vigorous vegetative propagation. Portion of old root with two new shoots.

[*Photo by H. Drake.*

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Plants cut at a Height of 2 in.—All plants showed strong regrowth and new flower-buds one month after treatment, but after that showed varying stages of vigour in their growth. By the spring one plant was completely dead, and the remainder showed strong regrowth by means of shoots from the old crown and roots (Fig. 11).

This experiment has shown that the cutting of plants once or twice in the same season increases their vigour, and even a number of cuttings does not devitalize them.

(*d*) *Defoliating Plants.*

At the beginning of March, 1937, ten plants in full flower in a good cow-grazed pasture at Ruakura were defoliated and deflowered. The plants were inspected monthly, and when necessary were defoliated at each inspection until July, after which they were left alone. Up to July two plants were still sending forth new shoots, while the remainder were dead above ground. By October four plants showed signs of life, and the remaining six were completely dead. Of the four living plants, two had shown signs of growth above ground all through the winter and two had started into growth in the spring. The crown and top portions of the roots of these had died back, but shoots were springing from the living portions of the roots.

The object of this experiment was to reproduce, in some measure, the action of defoliating insects on ragwort, and has served to show the great vitality of the plant in that some were still living after five defoliations.

(*e*) *Pulling Plants.*

Part of this experiment was conducted at Ruakura and part at Mamaku.

Ruakura.—Ten plants in full flower in a good pasture of perennial rye and white clover were pulled at the beginning of February. Two months later five of these were lifted, and two had living roots—left in the ground at pulling—either shooting or callusing over ready to shoot, while the other two were completely dead. In May the remaining five plants were lifted. Three of these had roots with new shoots, while the other two were dead.

Mamaku.—Forty plants, with seed almost fully developed and growing in a thick, abandoned pasture of brown-top and weeds, were pulled in the middle of March. Ten were examined to discover the amount of root-system left in the ground, and in three plants it was found that a portion of the crown had been left behind, while the remaining plants showed the larger roots with one-third to two-thirds their length left behind. Of the remaining thirty plants, a number

FIG. 7.—New shoot growths two months after chipping a rosette.
[*Photo by H. Drake.*

FIG. 8.—The shoots from each chipped plant could be seen forming small rosettes 2 in. to 3 in. in diameter in the pasture.
[*Photo by A. C. Poole.*

Fig. 9.—Plant kept deflowered for three months, showing a large crop of new buds and flowers one month after the last deflowering. [*Photo by H. Drake.*

Fig. 10.—Vigorous root propagation from a plant that had been pulled four months. [*Photo by A. C. Poole.*

were showing signs of shoots from the severed roots two months after pulling. Plants were then lifted at intervals, and by September all had been removed and examined. The total result was that 57 per cent. were completely dead and the remainder showed small shoots up to ½ in. long from roots left in the ground (Fig. 10).

From the point of view of control, this experiment has given promising results. Pulling is approximately 50 per cent. effective when done with plants in full flower, and would probably be much more so in a dry season—1937 being a very wet one—or if the roots were loosened with a fork before pulling. Further experiments, using this method, and using plants at different stages of growth, will be carried out during the present season.

Farmers when cutting down or pulling plants sometimes leave them lying in the pasture. It should be born in mind, however, that when this work is done flowers are usually present and are sometimes well developed. Flowers showing much colour will ripen their seed after being cut, so that, from the seeding point of view, they constitute as great a danger left lying in the pasture in the flowering stage as they do when left standing to ripen their seed.

Sometimes farmers deflower their plants before pulling, and place the flowers in empty lime-bags. They do not empty the flowers out thoroughly, and leave behind a few heads, which ripen their seed. The bags are then sent off to the lime-works for refilling, and the farmer who receives them back finds ragwort coming up in his pastures after the application of lime. Because of this, one sometimes hears the statement that lime naturally contains ragwort-seed.

FIG. 11.—Flowering plant two months after being cut 2 in. from the ground. The crown is sending forth vigorous new shoots.

[Photo by H. Drake.

Summary.

1. The ragwort-plant is described with emphasis on—(*a*) rooting-habit, and (*b*) seed-production.

2. It is shown that portions of the root severed from the original plant may produce vigorous new plants.

3. Experiments on chipping, deflowering, cutting down, defoliating, and pulling are described.

4. Pulling was found to be the only method of hand control at all effective, and that only partially so (Fig. 10). In a wet season this may be about 50 per cent. effective, but is likely to be more effective in a dry season.

The Plough and Profitable Pasture Improvement.

R. P. CONNELL, Land Utilization Officer.

IN farm-survey work carried out during recent years in the southern half of the North Island a feature that obtrudes itself is the relationship between the use of the plough and the progress in production and income made on dominantly grassland farms containing considerable arable areas, whether such farms be sheep-farms or dairy-farms. Two distinct groups of farmers have evolved in communities where originally all the farmers operated under essentially similar circumstances. One group, and that greatly the larger, has been satisfied to carry on without any outstanding programme of pasture improvement beyond the improvement that arises primarily from top-dressing as a means of strengthening and repairing somewhat poor swards. The members of this group quite often, and especially when there has been improved utilization of pasture-growth, have made considerable and profitable progress, though at times top-dressing, even when supplemented by improved utilization of feed, does not carry them far. The other group also uses top-dressing as a basic factor in their pasture improvement, but, in addition, makes use of the plough, at least fairly freely, as a step towards the replacement of inferior pastures by superior sown pastures. As a rule, the members of the latter group are substantially further ahead both in production and in net income than the members of the former group.

The explanation of this usually is clear and simple. Judicious arable work has enabled poor swards—pastures in which open spaces or weeds or inferior pasture plants or all of these are prominent and in which good clovers and grasses are not prominent — to be replaced by good swards embodying a range of improvement otherwise attainable slowly, if at all. Very often it has been profitable to interpose quite profitable arable crops between the breaking-up of the old pasture and the sowing-down of the new one. The fullest success has been associated with consistent and appropriate use of truly permanent and highly productive strains of pasture species, assured supplies of which have been given to commerce by the official system of seed certification.

A review of the position indicates, firstly, that at least while considerable areas of ploughable land are occupied by inferior pastures there will be considerable scope for profitable use of the plough—just what the position would be were all ploughable land occupied by high-class

pasture is another matter with which we need not concern ourselves at present; secondly, that arable crops can play a profitable role in grass-farming economy—arable cropping, if not fitted suitably into the work of the farm as a whole or if carried out in such a way as to be inimical to the well-being of the subsequent pastures, may be inadvisable and uneconomic. The great proved profitable scope for the breaking-up and resowing of poor pastures raises, among other matters, that of the cheapest and adequate supplies of suitable seed, and in this regard a question of seasonable importance is whether a greatly increased number of farmers, especially in the drier districts, could not with advantage undertake the production of seed to meet at least their own needs—a standard practice is to sow prospective seed-production areas in the autumn.

Caseous Lymphadenitis in Sheep.

Methods of Control.

By the Live-stock Division.

THE condition known as caseous lymphadenitis, found in sheep, is characterized by the enlargement of the lymphatic glands (commonly known as "kernels") of the body. The lesion in the gland consists of a localized inflammation, followed by a suppuration with nodule formation, a capsule surrounding the nodules.

The contents of this suppurating nodule consist of a greenish coloured pus, which when the condition has been in existence for some time becomes converted into a cheesy-looking material. The lesion is produced by infection with a specific bacterial organism, *Corynebacterium pseudotuberculosis* (Preisz Nocard bacillus). This organism is relatively resistant to drying, and under certain conditions it may remain viable for many months, but it can easily be destroyed by disinfectants.

Lymphadenitis is present in New Zealand to a limited extent, but it shows indications of spreading, hence it is specially necessary for sheep-farmers to take all known precautions to prevent it. In Australia, Argentina, and Uruguay it is evidently very widely distributed, and on account of it certain restrictions exist in connection with the importation of mutton into the United Kingdom.

Lymphadenitis may be found in lambs and hoggets, though wethers and aged ewes are most commonly affected. It occurs in all breeds of sheep, and it is a matter of economic importance that sheep-farmers should take precautions to prevent, as far as possible, the spread of infection.

There is very little evidence to show that the disease may be caused through ingestion of food or water contaminated with the organism which is the cause of the disease. As the trouble is more frequently located in the "kernels" situated at the upper regions of the limbs, this fact would suggest that the most common mode of entry of the organism is through inoculation of wounds accidentally made during shearing and crutching, and also to some extent in wounds occasioned in the operations of castrating and docking, or those made by dog-bites. That view is supported by work carried out at the Wallaceville Veterinary Laboratory, where more or less typical lesions have been set up by the experimental inoculation of skin wounds.

It is customary where hand shearing is practised to dip the blades frequently in a reliable antiseptic, and this should always be done. It is most important that all wounds, whether caused during operations or accidentally, should be at once dressed with some antiseptic preparation. If this precaution were carefully and efficiently observed in every case it would be of the greatest value in assisting towards preventing the setting-up of lymphadenitis in the sheep which have sustained the wounds, and also in helping to prevent the spread of the disease generally.

Sufficient evidence exists to warrant giving the advice that whenever the trouble is known to be present among the sheep on any property it will be a wise and desirable precautionary measure either to saturate the soil of the yards with a strong antiseptic solution—say, 1 part of non-poisonous dip to 20 parts of water—or, what is better still, to dress thoroughly the surface soil with quicklime and then turn it over.

In addition to the yards, there is a possibility that holding-paddocks nearby, which may frequently be used for temporarily accommodating large mobs of sheep, may be more or less contaminated. Where it can be conveniently done, it will be a good plan to plough up, cultivate, and resow such paddocks at intervals of a few years.

The dressing of all wounds seen at shearing-time and crutching is a very necessary precaution. This fact is brought to the notice of the Department from time to time when losses occur from blood-poisoning after shearing. Any extra labour involved is therefore worth the trouble by reducing the prevalence of lymphadenitis and also as a preventive of blood-poisoning. That ewes are more commonly affected is due to the fact that, owing to their longer life, they are more often exposed to infection of wounds liable to be caused during shearing and crutching.

If the foregoing instructions are thoroughly carried out it will go a long way to lessen the incidence of the disease. At the same time, in those flocks where the disease is known to be fairly extensive, such methods, although most valuable in keeping the disease under control, will not in themselves eradicate it. Each affected animal in the flock is and must be considered to be a potential carrier and spreader of infection, and its removal from the flock is at all times essential. Therefore, if at shearing or docking time, or any other convenient time, flocks known to be affected were thoroughly examined, and all affected animals removed and kept by themselves until they could be conveniently disposed of by means of the local meat-works, it would do much by way of eradication.

Wherever it has been possible to adopt this method in an affected flock and methodically carry it out, the incidence of lymphadenitis has been definitely lowered.

The lymphatic glands can be palpated by hand and any enlargement detected, especially in sheep not carrying too much wool and condition.

The best way to carry out such an examination efficiently on a large number of sheep is to put them through the shearing-shed, upend them, and examine each sheep carefully, hand manipulating the principally affected areas.

Before this method for the detection of affected sheep, with their subsequent isolation and elimination as a means for controlling lymphadenitis, is entertained, it would be advisable to seek specific instruction from a Live-stock Division

Officer. Afterwards the success or otherwise largely rests in the hands of the farmer concerned, as there is no very great difficulty in the procedure, although a certain amount of careful work is involved.

Prevention of Infection.

The principal features may be summarized as follows :—

1. Care in shearing and crutching, &c., to avoid unnecessary wounding.

2. Cleaning and disinfection of shearing-shed. During the off season the board and catching-pens could be scrubbed with hot water, soap, and washing-soda. Finally when dry sprayed with a carbolic spray (1 pint carbolic acid in 4 gallons water).

3. Attention to sheep-yards, holding-paddocks, races, &c.

4. Disinfection of blades or the cutters of machines.

5. Where practicable, the sheep could be dipped in a so-called "non-poisonous" dip off the shears.

6. If an affected mob is segregated, as the result of hand examination, these should be shorn and crutched separately at the conclusion of the main operations.

7. These precautions not only apply to the control of caseous lymphadenitis, but also to the reduction of losses from tetanus (lockjaw) and malignant œdema (blood-poisoning).

The Best Use of Pig Feed.

Elimination of Waste of Dairy By-products.

H. M. PEIRSON, Extension Officer in Pig Husbandry.

MUCH has been written about the quality of feed required by pigs. It must be rich in protein, well balanced, and adequate in amount. In New Zealand, however, the problem that is infinitely more urgent is to avoid waste of dairy by-products and starvation of pigs—*i.e.*, to use separated milk and whey so as to get the best returns from them. They are in abundance in spring and summer; in short supply in winter. High products are often wasted when they are abundant; pigs are often starved when no milk is available. Attempts to get through the winter-starvation period by having no pigs or by feeding those few that are kept with little milk and faith in their ability to recover in spring are the chief causes of the waste of milk that occurs in spring. When the spring comes there are either too few pigs or else pigs that are so small that they cannot profitably consume the milk available. By farrowing early, taking the first litter to bacon, and finishing the second at light pork before the milk goes off, many get over the winter-feed difficulties. Others winter a few stores and have them ready to consume the September–October milk surplus until the later litters can take up the running. Both these practices usually entail the use of some supplementary feed in the form of purchased concentrates or home-grown crops. What kind of supplements should be used, and when should they be used?

Meat and Fish Meals.

Of all the bought supplements meat-meal is the most useful and least costly for getting stores through the winter, for balancing the ration with whey feeding, and for feeding in-pig sows when milk is insufficient. Meat-meal consists of the cleaned intestines and scraps of all slaughtered animals, from which the fat is extracted, and which is converted into a fine, dry, sterilized meal containing 60 per cent. to 65 per cent. of protein and 3 per cent. to 5 per cent. of ash, chiefly lime and phosphate. In the absence of milk, 50 lb. of meat-meal and half a ton of roots, carrots, parsnips, mangels, swedes, artichokes, marrows, or kumikums will winter a store pig for a hundred days. Depending on his original size, the pig will grow at from ½ lb. to ¾ lb. per day, all pigs will be alive and healthy at the end of the winter, and ready to thrive on skim-milk. Recent trials carried out at Ruakura Experimental Farm by the Department of Agriculture indicate that ½ lb. of any other high-quality grain along

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with roots gives a satisfactory growth-rate, but that meat-meal is the most profitable supplement to use.

Whey Feeding.

Meat-meal makes whey feeding profitable, and there is no excuse for the annual loss of thousands of tons of whey and other dairy by-products which are thrown away in drains and creeks. A few years ago trials were carried out with cheese-whey to demonstrate the fallacy of selling all pigs farrowed after Christmas as weaners or slips at a ridiculously low price, when by the use of a little meat-meal and a run in good pasture the pigs could be economically turned off as pork and light bacon before the season terminated.

In this trial there were forty-eight pigs, representing six litters. These were divided into two lots. One lot of twenty-four were sold at ten weeks old for 8s. each, the balance—twenty-four pigs—being carried through to pork weights, which they reached in sixteen weeks, or 112 days. The cost of feeding these pigs for the final forty-six days was 4s. 8d. per pig. They were sold at 25s. each.

The value of these pigs at the time of the commencement of the trial was 8s. each. If the cost of the meal used for the forty-six days of the trial at £12 10s. per ton, 4s. 8d. per pig is added to this, the total expenditure was 12s. 8d. per pig. Deducting this from the price received, 25s., shows a margin of 12s. 4d. per pig. From this figure the value of the whey fed over the period of forty-six days—which would have otherwise been thrown away—works out at 1d. per gallon gross. It seems better to collect £15 for these 3,600 gallons of whey than to pour it down the drain. Another example from the numerous trials conducted with 290 pigs to ascertain if possible the amount of food required to produce 100 lb. of pork, and the time required to accomplish this, shows the same kind of result :—

Number of Pigs.	Average Live-weight.	Age, in Days.	Food used.		Food per 100 Live-weight.		
			Whey.	Meals.	Whey.	Meal.	Total.
290 ..	100	123	Gallons. 450	Lb. 83	450 (225)	83	308

2 gallons whey=1 lb. food unit.

Translating these figures into values, it will be seen that when whey is the basic food there was produced in 123 days feeding 100 lb. live-weight—the equivalent of 70 lb. pork—worth 420 pence at 6d. per pound, at a cost of 108d. for meat-meal (£12 per ton), leaving a return of 312d. for 450 gallons of whey. This is approximately 0·7od. per gallon.

The Farrowing Sow.

A sow carries her litter for about 112 days from the time of mating to their birth, and for the three months prior to farrowing range and good pasture will be sufficient for her needs. Care must be taken in feeding the brood sow three weeks to a month before farrowing if she is to do her best. Many of the troubles which take place just before and after farrowing may be traced to insufficient feeding. The sow must be given every chance if she is to produce a good healthy litter. She must be well fed, but not overfed, as occasionally is the case. One or two pounds of meat-meal or meat-and-bone meal per day should be given in addition to 3 gallons to 5 gallons of skim-milk or whey for at least three weeks before farrowing, according to the condition of the sow. When farrowing time draws near special attention should be paid to the condition of the sow's bowels. It is necessary to reduce the feed just before the litter is due as a precaution against milk-fever. So long as the sow is not hungry she will be better without food at this time. All she needs for the first twenty-four hours after the litter arrives is water, or, where a desire is shown for feed, some skim-milk (or whey) and bran mash, to which has been added a little molasses, which will help to regulate the bowels. This feeding can be continued for three or four days, when the meal-feeding can be again continued. From 1 lb. to 2 lb. daily in addition to the skim-milk and whey can be given. Do not give a full ration until the piglets are from seven to ten days old, when the amount of food can be gradually increased until the litter is three weeks old.

Watch Her Condition.

The condition of the sow, the size of the litter, and the appearance of the whole family will be the best guide as to the amount of feed required, which can be regulated as follows : Four to five pounds for the maintenance of the sow and 1 lb. for each pig in the litter. Thus where skim-milk is used a sow with a litter of ten would require 2 lb. of meal and 10 gallons to 12 gallons of skim-milk. One gallon of skim-milk, or 2 gallons of whey, is equal to 1 lb. of meal. See that the sow has always plenty of drinking-water. Avoid over-feeding, exercise freely, but not violently, to keep the sow's muscles firm and her system in good tone. There is no reason why a sow should not produce two litters of seven pigs per year, which when carried to bacon weights of 140 lb. produce 2,000 lb. of meat. This at present prices shows a gross return of £50.

Feed Requirements of a Litter.

Generally speaking, the New Zealand farmer is not so much concerned with the quantities of feed required for this purpose, since 90 per cent. is provided by dairy-farm by-products, such as skim-milk, and whey—they are not valued in the same sense as purchased feed stuffs. Much, however, depends upon their economic use. Small quantities of concentrated feed gives greater feeding value to the basic feed—skim-milk or whey. Of these concentrated feeds, in the opinion of the writer, there are none to compare with meat-meals and meat-and-bone meals, especially at castration, farrowing, suckling, and weaning time.

Figures relative to the amount of feed required by a sow with a litter up to the weaning-stage have been collected by pig-recording clubs for a number of years, and the following tables have been compiled from the selected records of nine hundred sows carried through on feed trial under ordinary farm conditions :—

Feed used on Weaner Production.

Skim-milk—
- Number of litters, 213.
- Number of pigs reared, 1,576. (= 7·4 pigs per litter).
- Average concentrates used—
  - Per litter, 143 lb.
  - Per pig, 19 lb.
- Average skim-milk used—
  - Per litter, 661 gallons.
  - Per pig, 89 gallons.

Total feed used—
- Per litter, 804 lb.
- Per pig, 109 lb.

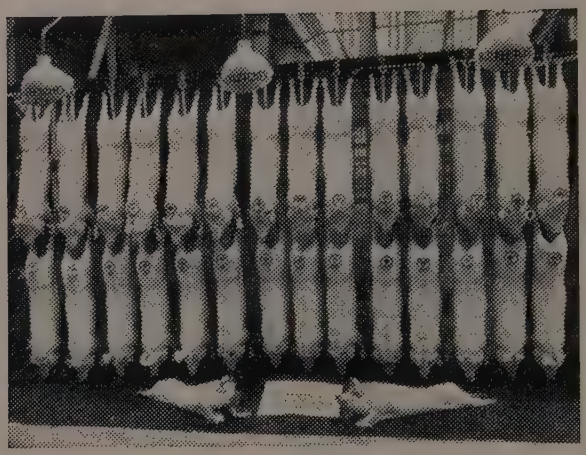
Cost of concentrates used per pig, 3s.

Whey—
- Number of litters, 91.
- Number of pigs, 641 (=7·5 pigs per litter).
- Average concentrates used—
  - Per litter, 175 lb.
  - Per pig, 25 lb.
- Average gallons whey used—
  - Per litter, 1,046 gallons.
  - Per pig, 150 gallons.

Total feed used—
- Per litter, 698 lb.
- Per pig, 100 lb.

Cost of concentrates used per pig, 4s.

FEBRUARY . . . **. . . JUNE**



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1937

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1938

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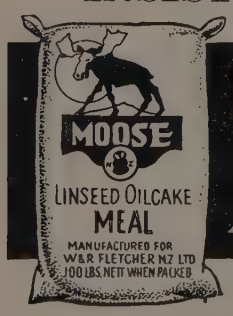

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A.J.

Use Concentrates for Young Pigs.

From the table shown it will be seen that the most economic gains made throughout the pig's life are the gains made prior to weaning, as the cost of production is restricted to the actual cost of the concentrate, representing "out of pocket" expenses. No charge can be made for the by-products, these being a waste product if not used for animal-feeding in some form or other. With protein concentrates at £14 10s. per ton, the productive cost per weaner of approximately 40 lb. live-weight is 3s. when skim-milk is the basic feed and 4s. in the case of whey. Concentrates used at the weaner stage are more profitably used than at any other stage of the pig's life.

Where meat-meal and meat-and-bone meals have been used in trials during the past six or seven years it has been a big factor in improved health and vigour not only of the sows, but in their litters. This better health ensures them against infection right up till slaughter, and the saving in rejections alone often pays for money spent on feed in early life.

One of the chief problems affecting the individual farmer is to keep pigs thriving all the year round—a period of semi-starvation is never profitable. There is a direct loss of over 20 per cent. of feeding pigs that have had a check as against those that have been kept growing under healthy conditions. Every animal wants a certain amount of food per day to keep itself alive, and the amount of live-weight gain made is proportionate to the amount of food consumed in excess of this.

Any kind of home-grown crop can supply the bulk of the feed required; meat-meal supplies the protein. Abundant protein ensures healthy and disease-resistant stock, rapid growth, and a greater tendency to leanness in the carcass.

And yet by the year I have proved it ere now,
As good for the purse is a sow as a cow.

Export of Apples and Pears.

Conditions of Government Guarantee for 1938 Season.

CONDITIONS for the Government guarantee on shipments of apples and pears made from New Zealand during the 1938 season are as follows:—

1. The guarantee shall be limited to approved varieties and classes of apples and pears packed in compliance with the requirements of "Extra Fancy," "Fancy," and "Good" grades, and shipped or loaded for direct shipment from any port in New Zealand on or before the 25th May, 1938, to the following markets: United Kingdom, Continent of Europe, Scandinavia, United States of America, South America, Panama, Canada, Jamaica, North Africa, Egypt, Palestine, and Eastern markets. Shipments made after 25th May must have the prior approval of the Hon. the Minister of Agriculture.

2. The Government guarantees to the grower a c.i.f. return of 11s. (New Zealand currency) per case in respect to those varieties of apples and pears set out in Table No. 1 appended hereto, and such other varieties of apples and pears as may be approved by the Hon. the Minister of Agriculture, graded, packed, and exported by the grower, or on his behalf, in accordance with the conditions set out herein and in the leaflet issued by the Department of Agriculture entitled "Export of Apples and Pears, 1938 Season—Export Regulations."

3. The guarantee shall be limited to apples and pears grown and shipped (otherwise than under f.o.b. contract) by *bona fide* fruitgrowers, or fruitgrowers' co-operative societies, through the New Zealand Fruit-export Control Board.

4. Any grower who exports any portion of his fruit crop outside the guarantee, unless he has obtained written approval from the Director of the Horticulture Division to do so, shall be deemed to have forfeited his right to participate in the guarantee with respect to all fruit exported during the season by him or on his behalf.

5. All apples and pears to qualify for the guarantee must be passed by an Inspector of the Department.

6. Payment of claims under the guarantee shall be calculated on the basis of the average c.i.f. price (New Zealand currency) per case received by the claimant in respect of the whole of the fruit exported on his account during the season to all markets, and only the deficiency between the average c.i.f. price realized for such fruit and 11s. (New Zealand currency) c.i.f. per case shall be payable under the guarantee.

7. Where, however, apples or pears of more than one variety and supplied by more than one grower are exported by a joint packing company or group in its own name, the guarantee shall be calculated separately in respect of the whole of the fruit supplied for export by each grower on the basis of the pool price received for each variety supplied by him: Provided that the joint packing company or group shall endorse each "inspection submit note" with the particulars relative to the number of cases of each grower's fruit included in such submit note.

8. The Government reserves to itself the right (*a*) to withold the guarantee from any grower who, in the opinion of the Director of the Horticulture Division, is not satisfactorily grading out, and exporting separately his "Extra Fancy," "Fancy," and "Good" grade fruit; (*b*) to withhold the guarantee from any grower in respect to any variety of fruit in the event of the Director of the Horticulture Division being satisfied that such grower is not shipping under this guarantee a reasonable proportion of the higher grades and popular sizes of that variety produced in his orchard; (*c*) to limit the quantity of fruit to be shipped to any market if in the opinion of the Hon. the Minister of Agriculture unrestricted shipments to such market would be prejudicial to this guarantee; (*d*) to insist on fruit being precooled prior to shipment if deemed necessary; (*e*) to withhold the privileges of the guarantee from all fruit shipped in vessels the storage facilities of which are held by the Department to be unsatisfactory; (*f*) to withhold the privileges of the guarantee with respect to any market in connection with which the New Zealand Fruit-export Control Board is of the opinion that satisfactory f.o.b. or c.i.f. trade is or can be established; (*g*) to withhold the guarantee with respect to any fruit packed contrary to such instructions as may be issued by or with the approval of the Director of the Horticulture Division; (*h*) to withhold the guarantee from any grower who resubmits fruit for export that has been previously rejected without having reconditioned such fruit as directed by an Inspector, or who resubmits such fruit other than as one complete line; (*i*) to

withhold the guarantee in respect to any shipment of fruit delayed in New Zealand waters for a period exceeding fourteen days, or such longer period as may be approved of by the Hon. the Minister of Agriculture, subsequent to the date such fruit was loaded for shipment upon an overseas boat; (*j*) to pool, for guarantee purposes, the fruit of two or more orchards owned by the same grower, and in like manner to pool the fruit of any number of orchards in the event of two or more persons being interested in the same properties, particularly if the fruit therefrom is packed in the same packing-shed.

9. The Government reserves the right to re-examine and to withdraw any fruit from export in the event of such re-examination indicating that by reason of faulty grading and/or packing, overmaturity, or other cause inimical to the keeping-qualities of the fruit it would be inadvisable to allow such fruit to be exported. All fruit so withdrawn shall be disposed of in New Zealand by direction of the Government on behalf of the owner, and the proceeds dealt with as though the fruit had been actually exported under the guarantee. But should such re-examination reveal the fact that any line of fruit, through careless or faulty grading and/or packing, is below the standard required, it will be deemed not to be covered by the guarantee, and the owner of such fruit may, at the option of the Minister, be held to have forfeited all right to participate in the guarantee for the remainder of the season.

Varieties approved for Export.

Apples.

1. Alfriston.
2. Ballarat.
3. Brighton.
4. Cleopatra.
5. Cox's Orange Pippin.
6. Delicious.
7. Desert Gold.
8. Dougherty.
9. Dunn's.
10. Frimley Beauty.
11. Glengyle Red.
12. Grannie Smith.
13. Gravestein.
14. Jonathan.
15. Kidd's Orange Red.
16. London Pippin.
17. Lord Wellesley.
18. Newtown Pippin.
19. Parlin's Beauty.
20. Pioneer.
21. Rokewood.
22. Rome Beauty.
23. Scarlet Nonpareil.
24. Stark.
25. Statesman.
26. Sturmer Pippin.
27. Tasma.
28. Willie Sharp.
29. Worcester.
30. Yates.

Pears.

1. Bailey Berg.
2. Beacon.
3. Bourré Bosc.
4. Beurré Capiaumont.
5. Beurré Clairgeau.
6. Beurré d'Amanlis.
7. Beurré d'Anjou.
8. Beurré Diel.
9. Beurré Easter.
10. Broompark.
11. Chaumontel.
12. Conference.
13. Doyenné du Comice.
14. Duchesse d'Angoulême.
15. Elizabeth Cole.
16. Giblin's Nelis.
17. Glou Morceau.
18. Harrington's Victoria.
19. Joséphine de Malines.
20. Keiffer.
21. L'Inconnue.
22. Louise Bonne de Jersey.
23. Madam Cole.
24. Marie Louise.
25. Packham's Triumph.
26. P. Barry.
27. Twyford Monarch.
28. Vicar of Winkfield.
29. Winter Cole.
30 Winter Nelis.

now! *is the time . . .*

● **Prevention will be found very much cheaper than cure. In most districts worms in sheep, unfortunately, have taken heavy toll, and the wise farmer is adopting preventative measures by starting to drench his lambs at an early age and continuing monthly during the first twelve months of their lives. Drenching ewes twice yearly has also become a paying proposition.**

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Facial Eczema in Sheep.

Possibility of a Recurrence of the Disease.

J. E. McIlwaine, M.R.C.V.S., District Superintendent, Wellington.

SHEEPOWNERS and farmers generally will recollect the serious outbreak of facial eczema which affected many sheep flocks in the months of March, April, and May of 1935. The experience then obtained, from an investigation carried out by the writer in the Manawatu district, may be of some service in case of a recurrence of the condition in the autumn of this year. Although one does not wish to enter the sphere of the prophet in predicting an outbreak of the disease this year, at the same time we are advised that the summer is likely to be a dry one and in such circumstances the outbreak of three years ago was a very serious matter for many sheepowners.

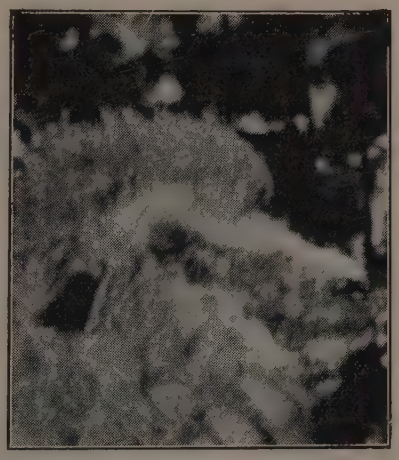
Briefly, the history of the previous outbreak, as it occurred in the Manawatu district, was that after a prolonged dry spell of weather extending from November, 1934, till the third week in February, 1935, rain fell at the latter date. A very luscious and rapid growth of feed then took place. In view of the previous dry fibrous feed to which the sheep had been thoroughly accustomed to digest, the sudden growth of soft feed following the rain seriously upset the digestive organs of the sheep.

Symptoms.

The first evidence of digestive derangement in the affected flocks was an openness and harshness of the wool of affected sheep. In many cases there was evidence of more than the usual amount of coughing—what may be described as stomach coughing, as no lung lesions were ever seen on post-mortem examinations.

In some flocks there appeared to be an excessive amount of sneezing and a marked discharge from the eyes and nose of affected sheep. At this early stage there was no evidence of any lesions on the face. If, however, a close examination of the sheep is carried out at this early stage frequently there is very marked evidence of a general jaundiced condition. The symptoms of jaundice are easily recognized by the farmer in the yellow colouring of the membranes of the eyes and mouth and a yellow colouring of the skin covering the body.

In many cases the jaundiced condition could be accepted as evidence of the digestive disturbance following upon the sudden and complete change in the general feed conditions within the short period of a few weeks. In many cases also the jaundiced condition could be accepted as a precursor or warning that the sheep were liable to be affected with facial eczema in the course of a few days. The digestive upset so interfered with the normal flow of the bile from the liver to the intestines that the bile-flow was dammed back in the liver, thus damaging the liver to an enormous extent in many cases, and forcing the bile into the blood circulation and setting up the yellow pigmentation of membranes and skin known as jaundice. The sensitizing agent, which rendered the sheep susceptible to eczema in those parts of the body not protected with natural pigment or wool, was carried in the bile. This agent was demonstrated in the bile from affected sheep by Dr. Hopkirk at the Wallaceville Laboratory.



Lesions on the face of a sheep.

No useful purpose can be served in an article of this nature by going into details in regard to the nature of the sensitizing agent. It is sufficient to state that the greater the content of the green colouring-matter of the herbage (the chlorophyll) the more liable is the bile to contain the sensitizing agent. Under normal conditions of digestion the sensitizing agent is excreted per the alimentary tract. It is perhaps the physical character of the food which initiates the digestive disturbance in the sheep in the first place and brings about the damming-back of the bile in the liver. In the second place, the bile contains the sensitizing agent obtained from the green feed in greater amount owing to the rapid growth of the feed and the absence of bleaching which takes place when the grass grows at a more normal rate or under more normal conditions.

Feeding Conditions.

Throughout the investigations it was noteworthy that the most severely affected farms were those of high carrying-capacity where the pasture growth rate is rapid and the sward is dense. The denser the sward the less bleaching of the growth takes place in a given time. On farms carrying three to five ewes per acre and upwards the number of cases of eczema was undoubtedly high. The number of sheep affected on such farms was higher still if the sheep were recent purchases and were not acclimatized to the rich feed conditions in the district. This applied particularly to brought-in sheep coming from lighter country (one sheep per acre country) when same were transferred directly to the rich heavy-carrying-capacity country. On farms with a normal carrying-capacity of from one to two sheep per acre, very few, if any, cases of eczema occurred in the sheep flocks. On the latter farms, however, it was noted that many small areas were as rich as some of the higher-carrying-capacity country. It was also noted that the farmers were using these small rich areas as flushing paddocks for the ewes, and as a consequence a few cases were seen in ewes on such farms after the period of flush feeding.

The post-mortem examination of sheep which were affected with the disease was carried out at the various stages and confirmed the above facts as outlined. The liver was the main organ to be seriously thrown out of gear. In many cases the bile-ducts contained thick inspissated bile, although the opening to the intestinal canal was quite open. A possible explanation of this lies in the fact that the affected sheep had not been feeding for some time and that rumination had ceased for some time. The stimulus for the normal flow of the bile was therefore absent. As a result of the drying-up of the bile in the ducts the liver tissue was very seriously damaged and in many cases the damage done was completely beyond any hope of repair. The livers became misshapen and affected with cirrhosis in all cases. It was not surprising, then, that sheep which recovered from the disease did not do any good afterwards as there was practically no sound liver tissue left to carry on the normal functions of this organ.

Treatment.

As a result of this explanation of the position farmers will realize that treatment of the cases is hopeless unless the treatment is undertaken in the early stages before the liver damage is done. Treatment would therefore require to be undertaken to deal with all sheep affected with jaundice before any lesions show up on the skin. To overcome the stoppage in the bile-flow doses of Epsom salts were recommended to be given at repeated intervals until the jaundiced condition began to clear up. In order to restore the normal digestion and rumination in affected animals a better-balanced feed was recommended. Access to older pastures, if available, or access to haystacks or hay placed in netting wire along the fence-lines was recommended. In many cases the sheep ate the hay greedily. This provided the fibre necessary to balance the soft grass-growth and restore digestion and rumination to the normal state.

Other local treatment by means of ointments was applied to the affected sheep's faces to enable them to stand up to the sun's rays. Shedding during the daytime and grazing at night-time were measures undertaken with a view to saving affected animals. In the light of past experience it is questionable whether any attempt would be made to save sheep in any future outbreak of the disease. The survivors last time were such hopeless animals with permanently defective and damaged livers that they were unable to digest and assimilate the food consumed, and as a consequence remained skeletons until they were killed off.

Prevention.

In view of the above rather depressing statements in regard to the treatment of affected animals it behoves all farmers to use every effort to avoid or prevent a return of the disease in their flocks. The main object of this article is to bring under the notice of farmers any information which may assist in preventing a return of the disease. It may well be asked what can one do in regard to prevention.

Facial eczema on a Hereford heifer. [*Photo by H. Drake.*

Previous inquiries showed conclusively that where green feed was available to sheep during the drought period such sheep were not so susceptible to the resultant flush pasture-growth. Such green feed as chou mouellier and rape was fed off on some farms during the drought period. On other farms — admittedly these were mainly stud flocks —a ration of chaff or dry feed was fed to sheep on susceptible pastures and no lesions of the disease were seen on sheep where either of the above practices were followed. In other words, the attempt was made under both the above farming practices to balance the feed throughout the season by (1) giving green feed while the drought existed, or (2) by giving dry feed while the flush feed following the rain was at its most dangerous stage.

The conclusion to be drawn from the above is that the sheep, as well as almost any other class of animal, is definitely susceptible to any sudden change in feed conditions. Should similar circumstances arise this season farmers are advised to watch their flocks very carefully for any evidence of jaundice resulting from a flush autumn growth of feed. Even when the farmer is deliberately flushing the ewes care will be necessary to see that this is not overdone.

If any evidence of jaundice is seen a change of feed is necessary, and dosing with salts may require to be undertaken immediately. Every attempt should be made to balance the ration by providing fibre (hay) while the sheep are on the succulent autumn pastures.

It is advisable to treat an unseasonable luxuriant autumn growth in high-carrying-capacity country as a crop, rather than as a pasture, and feed same off as a crop until the sheep become thoroughly used to it. Two or three hours daily grazing should be undertaken at first, with a run off into a bare paddock containing hay, or into a paddock containing an old pasture high in fibre. By adopting some such method the change in feed conditions is a more gradual one and a better-balanced diet is provided. In the writer's opinion the risk of a recurrence of an outbreak of facial eczema in sheep would thereby be minimized if not entirely eliminated.

Where an owner has any reason to suspect the disease in his flock he is advised to communicate with the nearest office of the Live-stock Division of the Department of Agriculture to seek further advice.

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Certified Rye-grass Seed.

Classes Available to the Farmer.

J. H. CLARIDGE, Certification Officer.

THE machine-dressing of certified perennial rye-grass seed is now in full swing, and the time is opportune to draw attention to the various classes of certified seed available to the farmer.

1. *Certified Government Stock Seed* is produced on contract by the Department from areas sown out with specially selected strains of perennial rye-grass seed.

The supply of this seed is limited, and intending purchasers are required to place their orders through a recognized mercantile firm before the end of May, in order that they may participate in the allocation of seed which will be made early in June.

2. *Certified Pedigree Seed* is produced from areas sown out with certified Government stock seed, subject to satisfactory field inspection and type test on the sample of seed harvested. This class of seed, together with those following, is obtainable through the ordinary commercial channels.

3. *Certified Mother Seed* may be the produce harvested from an area sown with certified pedigree seed, or may be harvested from an area over five years of age carrying a good "natural" type of perennial rye-grass.

In either case the area is inspected before harvest, while in the latter case the type of rye-grass on the area must previously have been proven to be good by means of suitable type tests.

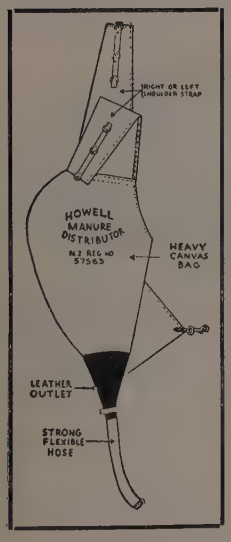
4. *Certified Permanent Pasture Seed* is the produce of an area sown out in certified mother seed, or of an area of equivalent merit. A field inspection of all areas is made before they can be eligible to produce certified permanent-pasture seed.

5. *Certified Commercial Seed.*—Certification in this class is based on the type examination of an officially drawn seed sample from the line of seed entered for certification. While the system employed is not so rigorous as that employed in the case of seed certified as permanent pasture, nevertheless subsequent testing has demonstrated that the quality of the seed certified in this class does not differ materially from that certified in the previous class.

Purchasers of certified perennial rye-grass seed should purchase their seed according to the use to which they intend to put the resultant pasture.

If the pasture is intended purely for the production of fodder, then quite satisfactory results may be obtained from the sowing of either certified "permanent pasture" or certified "commercial" seed. If, on the other hand, fodder-production is to be combined with seed-production, then seed of at least certified "mother" standard should be used, while if the farmer intends to make seed-production his primary object he cannot do better than purchase either certified "Government stock" or certified "pedigree" seed.

Farmers and merchants desiring further particulars relative to the various classes of certified perennial rye-grass seed or any other information relative to seed-certification should avail themselves of the services of the local Instructor in Agriculture for their particular district.



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Influence of Salt on the Flavour of Butter.

G. M. VALENTINE, Assistant Director of the Dairy Division.

(Continued from January issue.)

AN accurate check on the salt content of every box of butter from six churnings made in an Auckland creamery in an internal worker churn was carried out by the Dairy Research Institute at Palmerston North by the acetone method (*The Estimation of Salt in Butter;* McDowall and McDonald; Publication No. 64). A variation from 1·65 per cent. to 1·98 per cent. of salt was found between the lowest and the highest box from the same churning. It would therefore be possible to receive a London report of excess salting on a churning of butter which, judged by New Zealand records, contained the lower figure, while the person making the report had tasted a box containing the higher figure. The salt in these churnings was added to the churn dry after the butter had been "knocked up"—that is, had been gathered into large lumps by running the churn without the rollers in gear, a practice which would increase the difficulty of getting an even distribution of the salt.

As against these figures, the results obtained in two churnings examined in Taranaki are interesting. The first from an internal worker churn showed a maximum variation of 0·15 per cent. in the salt content between the highest and the lowest box, while the second, churned in a detachable worker churn, showed a variation of only 0·05 per cent. between the highest and the lowest.

In both of these churnings the temperature of the cream was about 40° F., the butter was churned to the size of peas and salted in the granular condition without knocking up; in other words, the practice followed in the earlier days of the industry after the introduction of the combined churn and worker.

Changes in Churning Practice.

From the foregoing it will be seen that a number of changes in buttermaking practice have been made with the passing of the years, and these may be summarized as follows:—

(*a*) High-churning temperatures, producing soft-bodied butter which was generally in large lumps when churning was finished and requiring a holding period between the two workings to allow the salt to dissolve and the butter to firm up.

(*b*) Low-churning temperatures, producing firm-bodied butter with small granules, and one long working-period in the presence of excess water.

(*c*) Low-churning temperatures, producing firm-bodied butter with small granules and a short working-period with a minimum of water in the churn.

(*d*) Churning with comparatively high temperatures, producing soft-bodied butter with large granules, and a short working-period with a minimum of free water in the churn. (Under these conditions a drainage period during working has to be given in order to get rid of surplus water.)

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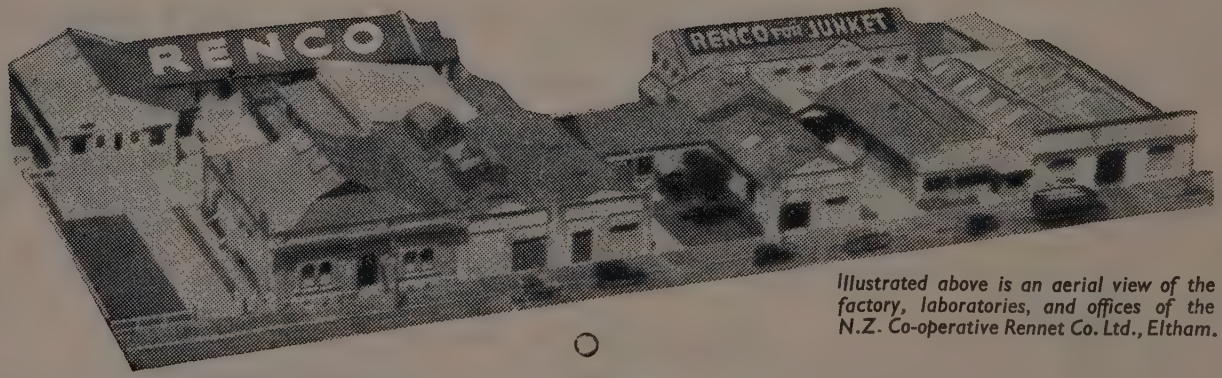

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The last (*d*) is to a great extent a reversion to the first (*a*), but with only one working. In some instances where difficulty has been experienced with faulty colour a second working on the day following churning has been given in order to correct this defect.

While all creameries which complaints of salty flavour have been received, in spite of the low salt content of the butter, have not followed the practices outlined under (*d*), it is a fact that there has been a general rise in churning temperatures during recent years, the rise covering a range from 40° F. to 45° F. to one of 45° F. to 50° F., due largely to the general increase in the average output and to labour-conditions inducing a speeding-up of the work. In many cases, however, these practices have not been followed, and one must look further for the cause of complaint.

Survey of London Report.

For this purpose a survey of all the London reports on butter graded from March, 1936, to March, 1937, was made, and from the records available at the grading ports, where every churning graded is tested for salt, the salt content of each churning was recorded against the cipher marks of identification included in these reports.

The number of reports in which salt was mentioned totalled 212. Of these, seven ranging from 1·35 per cent. to 1·7 per cent. were referred to as being "just right." Six were special lines of lightly salted butter ranging from 0·5 per cent. to 0·65 per cent. Ninety-two brands were adversely commented on, but forty-six of these were mentioned once only. Twenty-two brands were mentioned twice, and the balance of twenty-four brands more than twice.

Some difficulty arises in accurately assessing the value of the figures obtained, as the conditions under which butter is reported on from Great Britain do not ensure that the number of examinations made is in line with the number of churnings exported, and where only one adverse report is received no significance can be attached to it except as it assists to increase the aggregate. Speaking of those having three or more complaints, it is obvious that a certain number of managers are aiming at a salt content in their butter which is as near the maximum legal limit as possible. A number of the churnings complained of from some creameries were lower than the recurring figure in their monthly averages, some are higher, and others are so irregular that faulty methods of salting seem to be indicated. The striking point, however, is the number of instances in which butter containing a low percentage of salt is complained of.

In order to check their impressions regarding excess salting the London officers of the Division have had a number of samples, from the actual boxes examined, checked by an analyst from time to time, with the following results:—

New Zealand A: Rather salty on the after palate; 1·7 per cent. salt.
New Zealand B: Salting rather too pronounced; 1·6 per cent. salt.
New Zealand C: Salting somewhat pronounced; 1·6 per cent. salt.
Australian—
Salting definitely harsh; 1·8 per cent. salt.
Salting harsh, predominates over all flavours; 1·7 per cent. salt.
Nice mild butter. Would consider this as choice quality; 1·3 per cent. salt.
For comparative purposes—
New Zealand No. 1: Definitely too salt, finest; 1·6 per cent. salt.
New Zealand No. 2: Just about right, choice; 1·3 per cent. salt.
New Zealand No. 3: Just about right, choice; 1·5 per cent. salt.

The salt content of No. 1 is below the average for that brand, while Nos. 2 and 3 are starter butters.

For the purpose of making a comparison between the different districts the reports in which salting is mentioned have been tabulated as follows. These figures include only those reports which mention salt and do not include any described as "harsh," as this may be due to causes other than salt:—

Table I.

——	Number of Brands.	Boxes graded (1,000), Salted.	Number of Complaints.	Range.	1·6 per Cent. or less.	Above 1·6 per Cent.	Above 1·8 per Cent.		Correct Salting.	Special Light Salting.
							Number.	Per Cent.		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)
North Auckland	11	3,971	24	1·5–1·95	7	17	1	4·1	3	6
South Auckland	31		86	1·4–1·95	43	43	7	8·1	1·35–1·5	0·5–0·65
New Plymouth	17	413	35	1·5–2·0	4	31	10	28·6	4	..
Wellington ..	15	660	24	1·4–2·0	11	13	3	12·5	1·5–1·7	..
Lyttelton ..	13	159	24	1·4–2·0	6	18	3	12·5	..	..
Other ports ..	5	335	6	1·6–1·9	1	5	3	50·0	..	..
Totals ..	92	5,538	199	..	72	127	27	13·56	7	6

In the absence of definite figures regarding the relationship between the number of complaints and shipments, the same significance does not attach to those in the second and third columns, although they show that the North Auckland complaints refer more to highly salted butter than do South Auckland, and that New Plymouth and Lyttelton are greater offenders than the other two main ports. Taking 1·6 per cent. as normal salting, the South Auckland figures in columns (5) and (6) support the contention that cream treated under vacuum, the general practice in that area, must be lightly salted in order to avoid a salty flavour in the butter. The Wellington figures support the theory that ripened-cream butter must be lightly salted, since the use of starter is more general in that district than elsewhere in the Dominion. They also indicate that a number of creameries are working as nearly as possible up to the maximum allowed. Those for New Plymouth and Lyttelton indicate that high salting is generally practised in those districts.

Table II.

	1936.									1937.	
Boxes graded ..	430,088	231,979	89,495	76,790	237,407	473,924	723,876	169,137	904,171	780,170	679,042
	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
North Auckland	1	..	..	..	2	2	2	3	5	2	7
South Auckland	5	2	..	6	8	3	6	2	19	7	28
New Plymouth	2	1	1	..	..	1	5	2	9	3	9
Wellington ..	..	..	..	..	1	..	1	6	2	9	8
Lyttelton ..	..	..	..	..	..	..	4	..	7	7	2
Other ports ..	..	1	..	..	..	..	..	..	1	..	1
Total ..	8	4	1	6	11	6	18	14	43	28	55

Table II shows the number of complaints in respect of the gradings for each complete month covered by the reports, from which it will be seen that the number has increased as the season progressed, and that February shows the highest total in spite of a drop in the number of boxes graded.

Suggestions for reducing Complaints.

The first course which would suggest itself as a remedy for these complaints would be to reduce the maximum salt percentage allowed in export butter and provide for permission to be granted for the manufacture of more heavily salted butter for those markets which require it.

It can be accepted that a reduction in the salt content in those instances where oversalting is complained of will reduce the number of complaints received, more especially in those creameries where the maximum is being aimed at, but the real problem is, Why are complaints received regarding some churnings containing both high and low percentages of salt while other churnings containing the same range of percentages are accepted without comment?

If the butter made is of the class which requires light salting in order to conserve the flavour, the necessary reduction is in the hands of the buttermaker.

The large percentage of lightly salted butters complained of supports the contention that astringency is more pronounced in stored butters than in the same butter when freshly made (5), and it is accepted practice to lightly salt butter made for show purposes, which is examined under these conditions. At the same time instances are quite common where freshly made butter which is considered by the grader to contain excess salt is shown by analysis to be lightly salted.

The latter gives support to the suggestion that the remedy for this defect lies in correct manufacturing and salting methods, and the control of churning temperatures is the first point which should receive attention. Provided the cream is churned at the correct temperature for the district in which the butter is being made, the buttermilk can be run off, and the butter washed and thoroughly drained when the granules are of a size which will give a large surface area and assist in the even distribution of the salt. After the salt has been added the churn can be revolved at slow speed without the rollers in gear, and a very thorough mixture of the salt and water with the granules of butter obtained before the working process is started. The larger the size of the granule, the smaller will the aggregate surface area be, and the greater will be the difficulty in getting an even distribution of the salt, a difficulty which is increased many times when the practice of knocking the butter up into large lumps before salting is followed. The reduction in the amount of water retained in the churn at salting, and the reduced working period, makes it necessary to pay more attention to methods of applying the salt, and it is doubtful whether sufficient attention has been given to its even distribution over the butter, in view of the increased quantity made at each churning.

There is some evidence that wet salting—that is, salt with sufficient water added to it to produce a pasty condition—will make it possible to incorporate a higher percentage of salt in the butter without producing an astringent flavour than can be added by the dry-salting method. The addition to the salt of the amount of water which it is calculated will be required to bring the moisture content up to the desired figure some

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time before it is added to the churn reduces the danger of harshness. It also gives an opportunity to skim off any scum which may rise on the surface of the brine and avoids the necessity for crushing. To do this it is necessary to control the churning temperature of the cream so that thorough draining after washing the butter is possible, and that an amount of water in excess of that retained in the granular butter must be added to the churn to bring the water content of the butter up to within a few decimal points of the percentage desired when working is nearly completed. It is good buttermaking practice to carry the working process up to this point before a trial test for moisture is made, as the very small amount which will require to be added at this stage when this practice is followed will be more evenly distributed through the butter by the time working is completed than if a large quantity requires to be added.

It must be remembered that large quantities of butter have been exported from New Zealand which contained 2 per cent. of salt without adverse comment, and at one period shipments were made to the U.S.A. market with a specified salt content of 3½ per cent.

There is a demand, even in the British market in certain areas, for butter containing a comparatively high percentage of salt, but the problem here discussed is the incidence of salty flavour in butter containing a moderate or even a low percentage.

It can be accepted that practically the whole of the complaints received refer to butter made with salt of the highest quality, and information is available which suggests that there is less danger of this defect being found when salt made by other processes is used.

In order to get some information on this point arrangements have been completed to have a number of churnings made under export conditions using salt manufactured by a number of different processes, and these will be reported on in due course by the London officers of the Department.

(Concluded.)

Nectar-supply and Spring Conditions, Season 1937-38.

T. S. Winter, Apiary Instructor, South Auckland.

THE spring months of this honey season were the best experienced in the South Auckland district for many years. Calm, warm weather with a maximum of sunshine provided the necessary conditions for a season fully two weeks earlier than usual. Field pastures, hedges, native shrubs, and trees all flowered early and for a longer period than usual. A season such as this enables us to make comparisons with normal or bad years. The beekeeper, who depends almost entirely on seasonal conditions, should note carefully the reason for so much prosperity within the hives. Therefore, at this stage, the time is opportune to look back and study conditions that make beekeeping fairly easy.

Although the main honey crop in New Zealand is produced from white clover, there are many other sources of nectar-supply just as important, for without them the bees could be brought up to full strength to take full advantage of the clover-flow and store a surplus of honey. Most of our native trees yield a great deal of nectar, and the time of flowering enable the bees to build up a great force of workers.

The yellow kowhai (*Sophora tetraptera*) is one of the earliest spring flowering trees and lasts for a short period only, consequently the bees are unable to store a surplus from it. Where obtainable, however, it helps the bees greatly with early brood-rearing. The honey is a rich golden colour and has a pleasant flavour. Native fuchsia (*Genus fuchsia*) also blooms early in the season, and is worked freely by the bees at a time when all fresh nectar is absorbed in brood-rearing. There can be no mistake as to the source of the bees' food-supply when they are working this tree. By gently forcing their way into the nectar chambers of the flowers they become covered with a coating of deep-blue pollen, and present a pleasing picture on their return to the hives.

Another important early spring source in the South Auckland district is *Nothopanax arboreum*, commonly called five-finger. The honey produced from this tree is very often confused with kamahi honey. The flavour is pungent and unpleasant, while the colour and body resembles kamahi. A surplus is very often produced from this source, especially in the King-country areas.

That rather unusual tree rewarewa (*Knightia excelsa*), found only in the North Island and Marlborough, also yields nectar in abundance early in the season. The buds appearing in November and December grow in clusters and resemble a bottle brush. When fully open, the flowers present a strange tangled appearance. Honey stored from this source is a dull-brown colour and has a slightly pungent rather unpleasant flavour. This tree is available to the bees some seasons when weather conditions are unsuitable for working other sources. In this district it is found chiefly along the East Coast district and hill country.

On the plains and lowlands the cabbage-tree (*Cordyline australis*) forms one of the most striking objects of New Zealand bush scenery. The flowers are white or cream coloured and give out a strong, sweet scent. This tree is found all over New Zealand, and flowers in November and early December. In some parts of this district, especially the Hauraki Plains area, strong winds are sometimes experienced about this time, with disastrous results to the beekeepers. The bees are attracted by the sweet nectar offering, but very few ever return to the hives—owing to the strong winds and the load of nectar carried, they are forced down, and perish.

Some seasons almost the entire force of field bees are lost in this way in a few days, and the hives become very weak at a critical period of the year. Usually, however, the cabbage-tree is a great help to the bees at a time when nectar is scarce from other sources. The honey produced has a heavy body, mild, sweet flavour, and is almost white in colour.

Perhaps the most important of our honey-producing trees is the rata family. Here in the North we have the downy rata (*Metrosideros tomentosa*), commonly called pohutukawa. Pohutukawa honey is water-white in colour, and granulates almost immediately it is extracted from the combs if the weather is at all cool. The flavour is distinctive. Owing to its natural colour, this honey is useful for blending purposes. This tree is found along coastal areas, and yields nectar freely, so much so that a branch heavy in blossom will give a real shower-bath of nectar should it be shaken vigorously. The bees should be well forward and ready to store a surplus from this source when it is available about the end of December.

We have in this district, also, the North Island rata (*Metrosideros robusta*), a tree 50 ft. to 100 ft. in height. The flowers are smaller yet similar in construction to the pohutukawa and yield nectar freely.

These are a few of the chief sources of early nectar-supply apart from willows, barberry, buttercups, tea-tree, and heath. The straight willow provided a strong flow in September this season, and in some localities in the Waipa County this honey was extracted and placed on the market by October, a most unusual occurrence. The honey is very light in colour, granulates quickly, and has a slightly bitter flavour, but not unpleasant.

Barberry hedges throughout the whole district bloomed well and provided a steady flow of nectar in October. Honey from this source is very dark in colour, and has a strong caramel flavour. It is very valuable for feeding purposes right at the critical time of the year when the bees have to be kept going after the heath and willow finish blooming.

In some parts of this district this season it has been found necessary to extract all barberry honey above the brood-chambers to avoid getting it mixed with the finer grades associated with the main honey-flow. It is then stored away for feeding purposes.

Buttercup grows freely in all low-lying, wet country, and blooms before the main clover-flow. So heavy is the yield of nectar when weather conditions are favourable that the bees store it in every available space, restricting the work of the queens, and holding up progress within the hive. The only remedy is to extract the combs early to make way for the main clover-flow. These conditions apply more to the Hauraki Plains area. This type of honey is a dull amber and has a poor flavour.

Heath, tea-tree, and flax all yield dark-coloured nectar, with a strong aromatic flavour. Heath begins to bloom in this district in August, but the main flow from it takes place in September. Some thousands of hives in the Waikato, Matamata, and Waipa Counties are moved out to the heath country every spring, where they store a good quantity of honey before being moved back to the clover pastures. In this way the bees do not need artificial feeding, and build up nicely in time for the main honey flow.

Tea-tree and flax areas are avoided as much as possible in this district, owing to the nature of the honey produced. Tea-tree yields in November and December, and flax towards the end of December. Honey from both these sources is medium amber in colour, heavy body, and strong aromatic flavour. It is valuable for feeding purposes, and I believe more attention will be paid to it in the future.

Many factors have to be taken into consideration when establishing an apiary, and perhaps the most important is locality. The reason why so many honey-producers large and small do not get a fair average from their colonies is the fact that their bees, for want of attention, do not build up early enough to take advantage of the main honey-flow. This is most noticeable in districts where there is a scarcity of spring flowers, or during a late windy, wet, or changeable season right up to the main honey-flow. The bees that survive simply exist with a struggle until December and the main honey-flow commences.

Under these conditions the bees are not in fit condition to store a big surplus of honey. They are actually building up in numbers at a period when they should be storing a surplus, and in most cases cast late swarms. Under these conditions, also, in most localities a honey of low quality is obtained, simply because the bees were not strong enough numerically to deal with the nectar offering at the best period of the season. This state of affairs can be remedied by supplying just sufficient room for the expansion of the brood-nest, and steady stimulative feeding when necessary until the main flow commences.

Although the main crop of honey is gathered in this district in about five weeks, the bees should be prepared for it over a much longer period. It is the period of preparation that every bee-keeper should study closely.

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Factors in Successful Farming.

(2) Points to be Considered in Buying a Farm.

W. N. Paton, Senior Investigational Officer, Accounts Section.

It would be extremely interesting and yet very depressing to discover just what proportion of unsuccessful farming is due mainly to more or less irretrievable mistakes made in selecting a farm. The impression of keen observers is that the proportion of unsuccessful farming due to this cause is greater than many realize, and that this first step is not generally given the importance it deserves. It is not only a question of what is a fair price for a given proposition, but also one of whether or not the farm is really workable, has scope for improvement, and of the size compatible with capital and family labour available. A farm may be a reasonable proposition at a given price to one man, but not to another. In endeavouring to provide some guidance in the matter it has to be admitted that no simple set of rules meets the case. However, various points can be outlined which should serve as a reminder of some of the more important aspects to be given consideration.

Amount of Personal Capital.

How many people in buying a farm lay out practically all their personal capital in land, plant, and stock, &c., without any proper provision for working capital or contingency reserve? Again, how many people seem possessed of the idea of raising as much borrowed money as their personal capital will command?

These two mistakes are related in many instances, and, in the main, are due to lack of sufficient capital for the proposition concerned, or, rather, it is perhaps more correct and diplomatic to say that the size of proposition aimed at is, on the whole, too large. Granted, of course, large farms are generally more economical to operate than small farms; but, on the other hand, aiming for too large a proposition may mean failure and heavy loss on personal capital.

Amount of Family Labour.

The working-family unit is veritably the backbone of agriculture the world over. The character and diversity of the work on the average-sized farm for most forms of agriculture lends itself admirably to division amongst the various members of the typical rural family. Family labour, on the whole, is more dependable and flexible to the demands of the occasion, and, moreover, farming on such a basis provides what is tantamount to a life-insurance cover for all members of the family. The very fact that the future and success of the family is bound up in the future and success of the farm, and that the latter is right at hand to all members and provides the general atmosphere of home life, seems to create an urge to community effort not found to like extent in any other walk of life. In a study of farm labour on dairy-farms the writer found that males alone, on the average, did not do so well as the married couples and other family groups. Success in farming is not a question of the exploitation of women and children, but farming conducted under a reasonable utilization of such available labour and just reward to same is likely to render the younger ones better fitted in life, and in the long-run bring better happiness to all.

The main point to be borne in mind in this respect in buying a farm is that without sufficient family labour available a greater handicap is being undertaken. The greater the shortage of whole-time males and the heavier the development and improvement programme involved the more critical is such a handicap likely to prove.

Knowledge and Experience.

Apart from those who have been brought up on farms and continue on their own as farmers, many and varied are the previous walks of life represented amongst any substantial group of farmers. It must not be concluded from this that prior knowledge and experience is unimportant. All farmers are not successful farmers. Where there is a definite lack of prior knowledge and experience this should be allowed for in the purchasing of a farm. If the conditions and circumstances under which a tyro makes his effort are not sufficiently propitious, then the prospects of success are only realizable by the exceptional individual. If one were to trace instances of this nature it probably would be found that success was due not only to industry, but also to the possession of adaptability and the faculty of seeking and following sound advice. In other words, the "new chum" may have a reasonable chance if he is industrious, adaptable, and methodical.

Size of Family.

Size of family is important for two reasons—namely, how many are to be supported from the proposition, and how many are there to help? The latter has already been discussed and, as regards the former, its connection with the buying of a farm is sufficiently obvious in terms of likely income, necessary accommodation, &c., as not to warrant elaboration.

Kind of Farming to Choose.

The kind of farming to be chosen depends mainly upon knowledge, experience, and personal capital. Sheep-farming requires more capital than dairy-farming, and greater provision for lean years and working capital. Sheep-farm management varies more by district and by type than dairy-farm management. Sheep-farming also calls for greater business ability and acumen than dairy-farming, and hence prior experience is more necessary.

Of the various kinds of farming common in New Zealand, which on the average is the most profitable? This is a question which, due to lack of the necessary data, cannot be answered. Due to the amount of assistance and the primary-produce-prices position referred to in the introduction to this series, one kind of farming is likely to be about as profitable as any other. At least, if there are any significant differences between them, they are unlikely to be of such moment as not to be outweighed in individual cases by suitability or otherwise of personal qualifications for a certain kind of farming.

Choice of District or Locality.

Naturally the district or locality and kind of farming must suit one another. Knowledge of and familiarity with the peculiarities of a district are important in making a choice. If one has had some actual experience in the district, so much the better. Where there is a lack of knowledge and experience of a district it is wise to go over meteorological and agricultural statistics for the particular district, and consult officials and reputable persons for any particular information desired. Due allowance should be made for commencing farming in a new district, as it may take several years to become sufficiently familiar with conditions as to ensure reasonable returns.

Size of Farm.

The size of a farm should be sufficient to support the family concerned, and is dependent on the productivity represented per unit of area. Size of farm is also important from the viewpoint of how big an area and/or number of stock has to be looked after per whole-time male worker. The amount of area and/or number of stock per worker varies, of course, with the kind of farming, with the amount of cropping work, with the degree of intensification represented, and with the amount of development or deferred maintenance involved. Too heavy a loading per worker is apt not only to preclude improvement, but also at times even proper maintenance.

Conformation of Farm, Workability, &c.

The intending farm purchaser must have an eye to the general conformation and workability of the proposition under consideration. The farm can be of an awkward shape, or too broken for ease of subdivision and working. It may lie wrongly to the sun and prevailing cold weather. Gullies leading down from high hills often serve as high-pressure outlets for strong winds. The farm may be lacking in natural shelter, be poorly watered, or involve long transport over poor roads. Where necessary, one has to consider the cost of such things as long metalled drives; expensive culverts or bridges; dams or deep bores; lengthy, deep, or awkward drainage; more than ordinary provision of hedges or shelter belts; flood-protection; fencing over awkward, extra hard, or extra soft terrain; long electric or telephone lines; irrigation; and firebreaks, &c.

Condition of Farm.

By condition of farm is meant the stage of development, the state of care or neglect, and amount of infestation by weeds and animal pests that may be represented. Where much breaking in and development or cleaning-up of weeds is involved be sure to go over the details thoroughly in order that the costs of materials and labour involved are not underestimated. Such things as hard, impervious pans close to the surface, hidden stony ground, submerged stumps and logs, &c., must be looked for. Under this heading can be mentioned the possibility of the presence of poisonous plants, of disease being carried in the soil of moment to stock or crops, and of mineral deficiency of the soil. Poor provision and neglect in house, sheds, yards, fences, drains, water-supply, and general items coming under the heading of fixed improvements are not difficult to notice, but care must again be taken in making any necessary allowances.

Carrying or Productive Capacity.

To guard against the possibility of the coloured remark, which is more difficult to guard against than straightout falsehood, it is necessary to check up on the statements of a vendor or his agent with respect to such important points as carrying or productive capacity of a farm. Much can be learned by the person of knowledge and experience from the type and intensity of feed available, but has the pasture been heavily manured especially for purposes of sale? Questions of this type are not always easy to answer satisfactorily. However, a tour of inspection of the immediate neighbourhood and consultation with officials and reputable people of the district should suffice to elucidate the true position.

Scope for Extension.

Scope for extension in a farming proposition is often of some importance, as, for example, where future family requirements are likely to be considerably greater than at present. Can an adjoining area of sufficient size and of convenient shape

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be secured at a later date, such as by option or other arrangement? There may be an undeveloped area within the farm offered sufficient for the required purposes, but unless there is likely to be some reserve of capital and extra full-time family male labour available at the necessary time, such an area may often prove a liability rather than an asset. Thus in such matters the position has to be summed up with considerable care and exercise of forethought.

An alternative in providing for the future requirements of the growing family lies in the scope for intensification of the farm, or this may be supplementary to extension, as the case may be. Intensification as used in this instance is meant to include diversification as well. A small dairy-farm brought to a highly intensive stage in the exploitation of dairy cows and pigs might provide for the requirements of the growing family up to a certain point, but with the addition of, say, commercial poultry and/or bee farming a yet higher requirement could be met. As in the case of extension, to properly allow and provide for such contingencies requires taking a long-range view.

Farm Prices.

The price to be paid for a farm to a lot of people's way of thinking is the crux of the whole position of possible success or failure. Because they may have been successful in considerably beating down the vendor in his price, purchasers often deceive themselves that in so doing they have made a great deal. Such is not necessarily the case, as in the first case the farm may still be overvalued, and in the second the individual may be ill equipped in knowledge and experience and sufficient capital and family labour for the farm in question. In live-stock farming it is probably true to say that, on the whole, more attention relatively is given to the management of the land than to that of the stock. The price paid for a given farm may be high or low in accordance as to how it is stocked and managed subsequently. Hence the price to be paid is just as much dependent on the individual as on the land. Farm prices, of course, are average prices in terms of what the average farmer can obtain over a period of years from varying types and qualities of land under more or less standard conditions, and both are in sympathy with farm-produce prices and with general economic conditions, such as slumps and booms. The good old rule of buying on a falling market and selling on a rising market is very sound advice in connection with farm prices.

Assessing the Value of a Farm.

As a necessary protection the prospective purchaser should be able to gain some idea of the value of a farm for himself not only in terms of what the average farmer, but also of what he personally can be expected to get from it. This matter is of such importance that it is being made the subject of a special article which is to appear in the next number of this *Journal*.

Assuming an economic valuation has been made in terms of the farm and the intending purchaser that appears satisfactory, there may yet be further points to consider. Is there any likelihood of the climate of the locality proving unsuitable to any member of the family? What educational and other social amenities are readily available? Are there any legal difficulties in connection with title or tenure? What public-works or private enterprises are under way or contemplated in the near vicinity that may affect the proposition? The instances given are intended only to remind the prospective farm-purchaser not to overlook things of this kind which may come to mind less readily than many of the numerous other points dealt with.

Conclusion.

From what has been given it is hoped that all prospective farm-purchasers have not been frightened off for good. Yet at the same time it has been quite illuminating to the writer at least to endeavour to cover most of the main points worthy of consideration. By and large the matter is not quite so complicated and arduous as it may appear from this article. The main thing is to exercise sound common-sense, keep calm and collected throughout negotiations, make a list of all points to be taken into account, and go into everything thoroughly before putting pen to paper. Remember, farms and circumstances are not necessarily made to suit individuals, and hence it is a case of finding the right farm and right circumstances (at least as nearly so as practicable) and of being able to define these beforehand and thus be able to recognize them on sight. There is really no excuse for precipitate decision, or for that matter a faulty decision, provided one goes about things in a businesslike and systematic manner. Far better not to make a decision at all than to commit a blunder one may rue ever afterwards.

Finally, one has to be suited to the game of farming or else able to quickly become so fitted. Once the final step is taken, go forward with quiet confidence and enthusiasm in the attainment of the goal aspired to in this walk of life, which undoubtedly provides in greater measure than all others that balm of satisfaction to the ego of man.

(To be continued.)

Cases have been noted in South Canterbury where straight superphosphate has been used as a turnip fertilizer. Being a dry season, the germination injury has been heavy, and in one instance the area had to be resown owing to scarcity of plants.

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Suggestion for Shelter in Southland.

A. Stuart, Fields Division.

THE casual visitor to Southland is more often than not impressed by the lack of shelter on the majority of farms in the province, and this has been emphasized to a greater extent in recent years by the many miles of gorse hedges which have been eliminated by farmers' efforts, efforts in most cases unaccompanied by any endeavour to replace the shelter thus destroyed. While it is admitted that a well-trimmed gorse hedge serves the purpose for which it was planted there is an annual and recurring labour charge for cutting, which in some cases is performed more than once a year. On the other hand, too often is the neglected hedge encountered (Fig 1).

In extreme cases gorse has spread by reseeding, assisted occasionally by a burn, until half a chain or more on each side of the fence-line becomes an impenetrable thicket. Under these conditions it forms an excellent cover for rabbits which can become more of a curse than the gorse itself.

Exemplified in Figs. 2 and 3 is a suggestion for the use of New Zealand flax (*Phormium tenax*) as a shelter. Hedges such as depicted are a feature of the Orepuki and Te Wae Wae districts in particular and serve their purpose admirably. The strong fibrous rooting system of the flax-plant presents difficulty to the burrowing of rabbits in its vicinity. In addition, the hedge requires no trimming, and if cut every fifth year becomes a source of revenue to the farmer.

Mr. Derbidge, the local Hemp Grader, has estimated that a hedge as illustrated in Fig. 2 would yield in the vicinity of forty-five tons of leaf per acre, and thus the usual royalty could amount to quite a substantial sum on a farm sheltered in this manner.

It was not my intention to stress the value of shelter, as this does not need emphasizing, beyond drawing attention to the fact that much energy is devoted each year to the growing of essential winter feed chiefly exemplified by the turnip crop, yet only too often is the full benefit of such feed not obtained through lack of shelter provision. That shelter is of extreme importance can be gathered from Fig. 4.

Flax hedges could be used extensively over the whole of the coastal area of Southland, but the use of flax north of Winton could not be recommended generally with the same confidence, as from that point northwards lighter rainfalls are experienced. The only objection to the flax hedge is the fact that cattle

Fig. 1.—A typical example of neglected road-line hedge providing a great harbour for rabbits.

Fig. 2.—Flax hedge at Waihoaka, protected from cattle by three barb wires. The hedge running at right-angles on the right had been cut two months prior to photography.

Fig. 3.—Clumps of flax planted at corners of paddocks may be more economical and as effective as continuous belts.

[*Photos by J. M. Smith*

would chew the leaf in winter, and consequently to avoid this it would be necessary to erect a two-barb fence on the inside of the line planted. On a straight-out sheep farm this would not apply.

Flax-fans for planting can easily be obtained throughout Southland, as originally large areas of flax existed, but the main areas have now been drained and placed under cultivation. A large flax-bush can be divided up into as many as fifty fans for planting. In digging up a bush it is well to dig some little distance from the roots, getting well underneath, by which method it will be found that the fans are easily separated or cut out with the spade. Before planting it is advisable to trim up the fans, as if the leaves are left on they die away and may retard the growth of the young shoots.

Fig. 4.—Cupressus macrocarpa hedge affected by the prevailing wind at Waihoaka. A flax hedge planted alongside is unaffected.

[*Photo by J. M. Smith.*

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Truck Farming at Pukekohe.

J. E. Bell, Fields Division.

PUKEKOHE Hill lies just to the north of the Waikato River where it takes its last turn to the west to enter the sea. It is an extinct volcano with little or no sign of a crater. To the south it merges into an older lower hill, which it has partially engulfed. The hill's rounded top rises gradually above a tableland, which is about 200 ft. above sea-level. This tableland, formed by volcanic eruption, barred the northward progress of the Waikato, which then worked its way west to its present entrance to the sea.

Two miles away to the north-east of the hill lies Pukekohe, the chief centre of Franklin County, a township with 2,500 inhabitants. The Main Trunk Railway line makes a curve to the west to include it in its chain of linked towns. Franklin County is a rich dairying and fat-lamb raising district.

The Pukekohe district, before being settled by Europeans, was covered with bush comprising puriri, taraire, kohekohe, totara, rimu, and matai. On the more fertile areas the puriri was most dominant; on the less fertile areas the totara was more common. There were also patches of fern.

Mild Climate.

Pukekohe enjoys a mild climate, the summers not being unduly hot, nor the winters severe. There is an abundance of sunshine. On the hill frosts are seldom experienced, and then are very mild. The rainfall is about 60 in. per annum, and is evenly distributed. Normally the driest period is in January and February and the wettest is in July and August. The prevailing winds are westerly.

The soils surrounding Pukekohe vary a great deal in texture and fertility. On a few acres of drained swamp the soil is of a peaty nature and low in fertility. The volcanic soils are red, chocolate, or brown in colour, and vary in fertility to a large degree according to their age and the natural vegetation that once grew on them. All soils are markedly deficient in phosphate. The older soils, having been subjected to leaching for a longer period, are more deficient in other minerals, notably lime, and in some cases also in potash. The soils which formerly grew vigorous leafy puriri forest are more fertile, probably due to the heavy annual fall of puriri leaves. The soil on the gradually sloping sides and top of Pukekohe Hill once grew heavy bush, and when the phosphate deficiency is made good is fertile and stands intensive cropping. Here the soil is a loam, generally of a chocolate colour with somewhat peculiar physical attributes. The subsoil, a clay loam, brown in colour, is about 15 ft. deep, with crumbly basaltic rock from which it is derived below it. The soil is naturally very well drained. Cultivation can be carried out even while the soil is wet with little harm to the tilth, yet the soil sticks so tenaciously to implements that bright clean mouldboards of ploughs will not clean while the soil is but slightly moist.

Size of Farms.

A few years ago vegetable-growing was practised as a side-line on dairy-farms throughout the better volcanic soils in the county. Now truck farming is practically confined to the fertile soil on the top and gentle slopes and around the base of Pukekohe Hill. The farms are small, varying from 5 acres to 20 acres in extent, and averaging about 10 acres. On the majority of the truck farms about half the area is alternatively in pasture on which dairy cattle and working horses graze, and the other half in crop, mainly potatoes and onions, and a small portion in supplementary feed for the dairy cows. About one dairy cow or one horse is kept for each acre in pasture. The pastures are not top-dressed usually, as the residual effect of fertilizers applied to the land while it was in crop is sufficient for satisfactory growth. Usually two horses are kept for cultivation purposes on each farm. Lately contractors' horses or tractors, and tractors owned by the grower, have replaced the horses on some farms. The rotation is about three years in pasture and about three years in crop. The first crop after pasture is one of potatoes, followed by different sequences of crops, potatoes being most prominent, then onions, then other crops such as cabbages, cauliflowers, pumpkins, carrots, and green peas. On other truck farms—mainly leased areas, where dairy cattle are not grazed—the whole of the farm, except an acre or so to feed horses, is devoted to continual intensive cropping. On these farms dairy cattle are not grazed. Yet there does not appear to be any serious lowering in fertility of the soil.

The free draining soil, mild climate, and freedom from severe winters and frost make the "Hill" ideally suited to the growing of winter crops such as early potatoes, early peas, winter cabbages, cauliflowers, and lettuce. The ground used for cropping is seldom fallow, one

A view of the surrounding country to the south-east from the slopes of Pukekohe Hill. Tuakau Township is in the distance. The density of the farming population occupied in dairy-farming chiefly is shown by the numbers of homesteads. In the foreground is a new rye-grass pasture, whilst in the middle distance to the right the harvesting of early potatoes is in progress.

crop quickly following another. Generally two or three and up to four crops are grown in twelve months in the same ground. For example, one autumn-grown crop of cabbages, one winter crop of potatoes, one spring crop of pumpkins, and one summer green manuring crop have been grown.

Green Manuring.

For a number of years green-manuring catch-crops such as lupins, barley, oats, mustard, and Japanese millet have been grown to an increasing extent in the summer and autumn. On account of its rapidity of growth and because its leaves rot quickly and its stems break up soon after ploughing in, the mustard is the most popular green-manuring crop. Generally insufficient time is allowed for the decay of the green crop, and the following crop (usually potatoes) is planted at the same time as the green crop is ploughed in. Under continuous cropping it is hoped that green manuring will approximately replace the three years' spell of the fields in pasture. It is admitted, however, that green manuring does not replace fertility as well as grazed pasture. The pumpkin crop, with its wealth of tops, is in reality a green-manuring crop of some value, and perhaps adds somewhat to the fertility of the soil. Potatoes, onions, cabbages, and cauliflowers are crops which rob the soil of fertility.

Pukekohe Hill from the north. In the field in the foreground the near portion is being ploughed after a cabbage crop, while farther away a crop of peas is growing. The hill in the background is intensively cropped to supply New Zealand with early potatoes, onions, pumpkins, winter cabbages, cauliflowers, and carrots.

About fifteen to twenty years ago white carrots were a common crop, grown chiefly to feed horses in the City of Auckland and in mines at Thames and Waihi. But because the horse has been almost entirely replaced by the motor, the carrot crop, now of minor importance, is grown for human consumption in the city, and for dairy cows on the truck farms where these are kept. White carrots have been replaced largely by the lower yielding red carrot, more suitable for the household.

Problem of Weeds.

Weeds are difficult of control in these truck-cropping areas. The dock, which has been allowed to take a hold in many fields, being a perennial and not easily killed in pastures, is hard to eliminate. The dock has to be hand-pulled in growing crops and removed from the field. Seeds of the annual summer-growing amaran-

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thus species are present in their millions in the soil in all fields. Being an annual and liked by stock, it presents no difficulty in pastures, for plants which appear in new pastures are soon destroyed by the competing grass and the grazing animal. In cultivated ground, however, eradication is not easy. It is easily destroyed by hoeing and intercultivation while it is young, but it grows at an amazing rate, and when the plant is large it is hard to kill, as pulled or hoed plants will reroot readily on the ground surface. One farmer on a mixed dairying and potato-growing farm has successfully utilized this weed as a green-manuring crop, for which purpose it is ideally suited on his farm, because there the summer-growing crops are not important. After the early potato crop is removed, the fields not growing crops in the summer are left, and soon a heavy dense crop of amaranthus appears, to be ploughed in the following autumn.

Perennial rye, Italian rye, cocksfoot, red clover, and white clover comprise the seed mixture for sowing down the land to grass. White clover, however, is not always sown, as its seed is generally present in the soil and is one of the most difficult weeds to combat in the onion crop.

Fig. 3.—Potatoes suitable for planting. During cutting operations the two smaller potatoes on the right would be discarded, while those on the left exemplify favourite types of tubers for seed.

Potato-growing.

The potato is the most important cultivated plant, and one or two crops are grown annually on about 1,200 acres of land. After pasture, the ground is skim ploughed in March, left for a few weeks, and the sod then disintegrated by disking shortly before the first deep ploughing. The sets for the early potato crop (or main crop, as it is known locally) are planted from late April till July after another ploughing or after the mould plough. From four to six weeks after planting, the area is tine harrowed to destroy seedling weeds. When the young potato-plants appear above ground the land is hand hoed, and, when the rows can be seen plainly, intercultivated. The early intercultivations are deep and close to the young plants, with later ones narrower and shallower as the potato rooting system extends. When the crop is sufficiently advanced it is moulded. This is done when there is danger of severe winds knocking about the potato top and usually when the crop is about 1 ft. high. Later a further and final moulding is given. The moulding, besides supporting the plant, improves the drainage and prevents exposure of the young growing tubers.

The standard variety used is Northern Star (locally called Gamekeeper). Other varieties are very uncommon. The Arran Chief has been grown by a few farmers for a number of years, and on one farm for over eight years. Other varieties have been tried spasmodically, but not for long.

Large sets give the better yields and are more commonly used, being split from rose to stem end. Small sets have a small piece about the size of a penny cut off near the rose end. The cutting of the sets may take place some days prior to planting. At cutting-time the sets are examined for shape, stage of growth of the sprouts, and disease. The ideal sought after is round in shape with deep eyes showing signs of commencement of growth of the sprout. Misshapen sets may come from plants where the vascular system has been blocked or interfered with by disease, and fleet eye in the potato may be induced by mosaic infection. Sets discarded for shape and no sprout growth are set aside for planting at a later date, generally immediately following the harvesting of this early crop. Sets discarded for disease are thrown away or used for pig-feed. The cutting of the sets induces growth of the sprout and enables the grower to discover those with discoloration of the vascular ring, and as this is a sign of ill health of the tuber all such sets are discarded. At planting-time the sets are either pressed into the soil about half-way down the plough furrow or laid in the bottom of the mouldboard furrow. The depth of planting is about 3 in., and the sets are spaced about 14 in. in rows 2 ft. to 2 ft. 4 in. apart. The seed-bag for planting the sets is made from a fertilizer-bag, in which a hole is made through which the planter thrusts his head after partially filling the bag. As the planter walks along the furrow, he uses both hands, one gathering sets through one of two holes in opposite sides of the bag, while the other is planting. If planting is done after the plough, the spacing of the sets is gauged roughly. In the mouldboard furrow, however, the planter uses his feet for gauging the distance, and places his feet alternately in front of the sets that have just been planted. The fertilizer, which is broadcasted along the furrow by hand close to the sets from a bucket slung by a strap over one shoulder, is applied at the rate of about 18 cwt. per acre. Trials have shown that, when the fertilizer is applied in a narrow band close to the potato sets, higher yields are obtained than when the fertilizer is applied over the whole of the face of the furrow.

Fertilizer mixtures vary considerably in composition, and no standard mixture can be given. Once bonedust alone was used, but now mixtures of three or four fertilizers are employed. About two-thirds of the mixture usually comprises a varying amount of super and bonedust. The remainder consists of sulphate of ammonia at about 2 cwt. to 3 cwt. per

acre, with frequently 2 cwt. of sulphate of potash and 2 cwt. to 4 cwt. of blood or blood and bone per acre. Extensive experiments carried out on the "Hill" have shown that quick-acting fertilizers such as super and sulphate of ammonia give better yields, but that there is no response in yield or quality from the use of potash. Many growers, however, include potash in the mixture—probably a wise precaution. Less of the quick-acting fertilizers and slightly less quantities altogether are used on the later-sown areas and on fields in better heart, such as those where the first crop of potatoes is planted after pasture. Lately some of the super and the sulphate of ammonia is held over for application as a top-dressing during the early growth of the plants. The super has been shown in experiments to give no better results this way, but there is evidence that sulphate of ammonia is more effective applied as a top-dressing. If the planting is done after the plough, labour has to be arranged so that the team of two horses and a single furrow plough are kept going. Two planters of seed and one hand-sowing fertilizer are sufficient to keep this team going. A halt of the team at the end of each furrow is necessary to scrape the adhering soil from the mouldboard. Horse-drawn planters of seed and fertilizer are used to a limited extent, particularly on the more level and larger fields.

The time of the planting is largely dependent on the freedom of the particular area from frost. Generally the higher the altitude the freer the area is from frost and the earlier the planting can take place. On the higher slopes of the "Hill" the planting takes place from late April to early June, on the lower slopes in June, and on the flat to rolling country surrounding the "Hill" in July. Before planting, the barberry hedges surrounding the fields to be planted are cut low, for on frosty nights they halt the drift of the wind, causing the frost to settle thickly for a few yards to the leeward of shelter and possibly destroying the potato tops for that distance into the field. Trees, also, are cut, for the potatoes shaded by them from the first blush of the sun would also suffer from frost. Where there is a good draught of air, such as under tall growing trees, frost is not likely to settle and cause damage, but such trees are usually cut down if they are liable to cast a shadow over any portion of the crop in the early morning. Apparently damage from frost is influenced by the sunshine which follows, and if the thaw of the frosted leaves is gradual the damage is less liable to occur.

When the crop is about 3 in. high the first spraying for late blight is carried out. The growers use Burgundy mixture, as it is difficult to obtain good burnt lime for the more effective and less drastic Bordeaux mixture. The mixture used is about 3½ lb. to 4½ lb. bluestone and 5 lb. of washing-soda to 40 gallons of water. For early sprayings 3½ lb. of bluestone are used, and the strength is increased according to the difficulty of control and the vigour of the crop. The bluestone is dissolved in a wooden barrel almost full of water by suspending it in a piece of scrim. When ready for spraying, the washing-soda is dissolved in boiling water, and the solution is boiled for a few minutes. This is said to improve the sticking quality and effectiveness of the spray. The hot soda-water is then poured into the bluestone solution in the barrel and stirred vigorously. The mixture is applied to the crop from knapsack spray-cans, one row being sprayed at a time, with the spray directed downwards over the foliage. On larger and more level areas horse-drawn spray-carts are used to apply the Burgundy mixture. About four sprayings are required to keep down effectively the late blight, but control is not difficult in the very early potato-crops, on account of the cool temperatures usually experienced during their growth.

(To be continued.)

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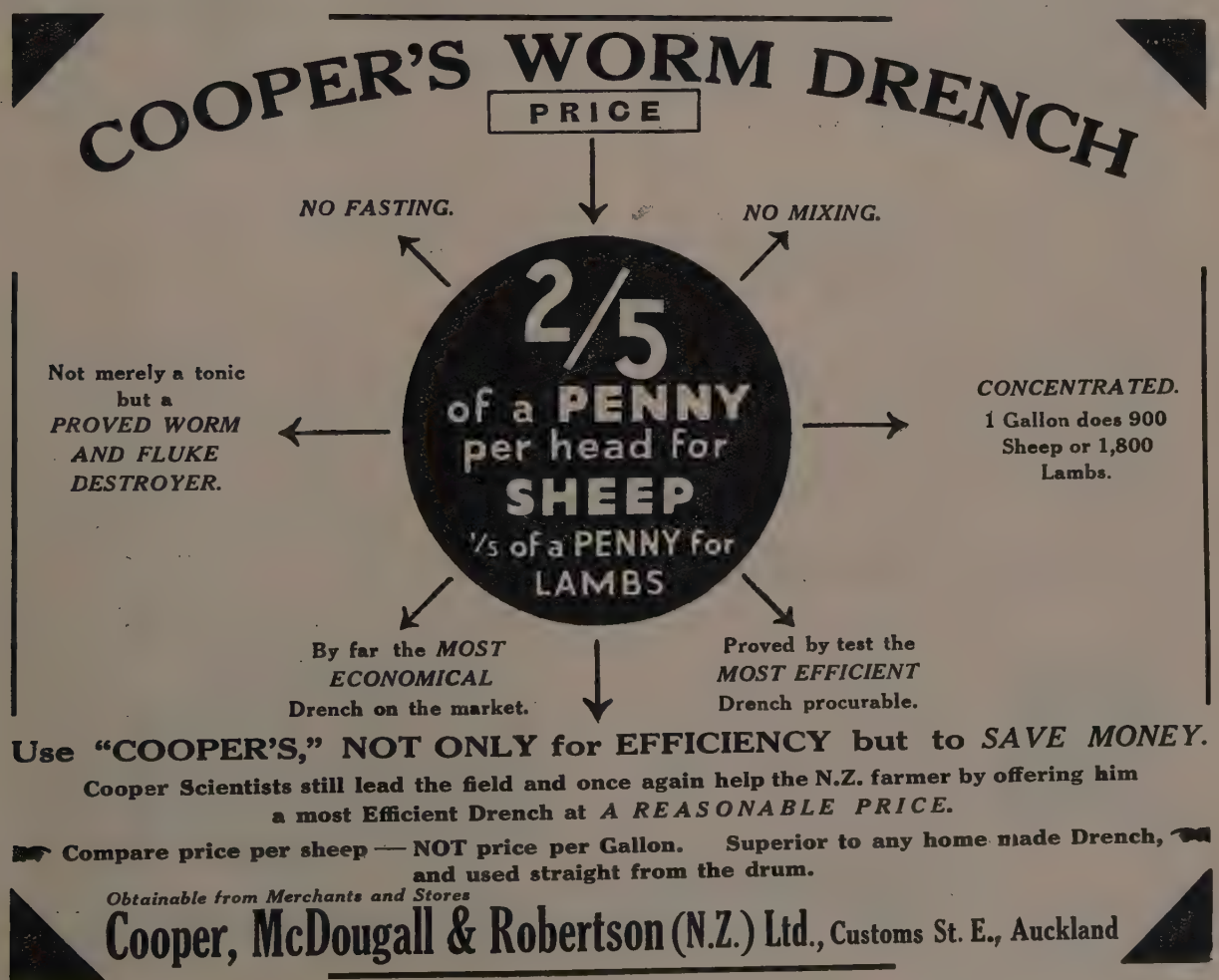
New Assistant Director-General.

THE appointment of Mr. E. J. Fawcett, M.A. (Cambridge), to the position of Assistant Director-General of Agriculture was announced this month by the Minister of Agriculture (the Hon. W. Lee Martin). The Minister stated that Mr. Fawcett's practical experience of farming before the war, his wide range of activities in the Department and the Government service, and his academic qualifications had equipped him fully for his new position.

Mr. Fawcett was born at Tadmor, Nelson, in 1892, and was educated at the local primary school. His early life was spent in farming on his father's property. In 1915 he left for the war in the Seventh Reinforcements, with the rank of second lieutenant, and served in France until 1917, when he was incapacitated at the Battle of Passchendaele. After this engagement he was awarded the Military Cross. He was discharged from the Army with the rank of captain in 1918. Shortly afterwards he was awarded a Kitchener Memorial Scholarship, tenable for one year, and obtained permission to enter Cambridge University under a special dispensation. On the completion of this year Mr. Fawcett was granted a New Zealand Expeditionary Force Scholarship, and after three years' residence at Cambridge, took the B.A. degree, specializing in agricultural science and economics. He completed his M.A. degree in 1925.

On returning to New Zealand in 1922 he was appointed a junior instructor in agriculture, and in the following year was promoted to the position of instructor in charge of the East Coast District. In 1925 he was transferred to the Head Office of the Department as Agricultural Economist, and while serving in this capacity carried out a number of investigations and surveys which have been the basis of much valuable work by the Department. He has published many papers on the economics of agriculture, and has acted in an advisory capacity on several Committees and Commissions. In 1934 he served on the Secretariat of the Dairy Commission. In 1936 he was promoted to the position of Technical Liaison Officer of the Department, and has represented the Department on the Bureau of Industries, the Tobacco Board, and other bodies.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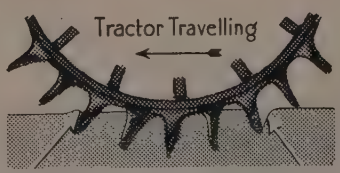

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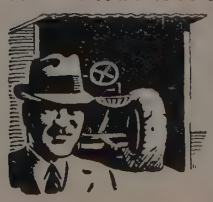

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Farm Practice and Management.

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Importance of Clover.

THE outstanding feature in the grass and clover strain trials laid down by the Fields Division has been the appearance of the plots sown without clovers or with poor types of white clovers. After several months such plots generally assumed a brown unthrifty condition. In fact, their appearance would immediately suggest a no-manure plot or an area sown with a poor type of rye-grass, although, in fact, the areas have been adequately top-dressed with lime and fertilizers and the best strains of rye-grass were sown originally.

One has heard of white clover being omitted from a seeds mixture entirely on the score that volunteer white will come into the pasture sooner or later. But there is no justification for such a course even in districts where this appearance of "natural" white clover does take place. The sward may pass through a phase of one or two years in the same unhealthy condition as the experimental plots referred to above. Moreover, volunteer strains can never take the place of good white clover strains.

The first year in the life of a pasture is of extreme importance. What occurs during that time may decide whether in several years hence that pasture is to produce 100 lb. or 300 lb. of butterfat to the acre. The foundation of a good pasture is a good "take" of persistent white clover with other useful grasses. Hence, everything possible should be done by way of adequate cultivation and manuring and the sowing of good strains of the species to promote that blending of white clover and grasses so essential for the building-up of a first-grade pasture.

Potash in North Taranaki.

TOP-DRESSING trials in North Taranaki commenced some ten years ago showed that in some districts potash applied in the form of 30 per cent. potash salts gave a good response, particularly in the amount and vigour of the white clover, and subsequently in the vigour of the rye-grass and other grasses. In order to find out and define if possible those localities and soil types that gave this good potash response, one hundred small trials were commenced in 1935, and have since been under close observation. A review of these trials, which extended from Pukearuhe in the North to beyond Rahotu along the coast, and inland to Purangi, Toko, and Cardiff, shows in general a response to potash sufficient to warrant the farmers in the area covered by the trials to seriously consider the possibilities of applying potash in addition to phosphate manures such as slag and super. While no areas can be definitely marked off as not responding to potash, it is of interest to note the localities where no responses were recorded. Between Urenui and Pukearuhe all of eight trials gave no response. Between Urenui and Waitara and inland to Tikorangi and Lepperton, of sixteen trials ten gave no response and six a good response. Three of these six were in the vicinity of Tikorangi.

From Lepperton to Stratford and inland to Purangi and Toko, of twenty-four trials fifteen gave no response. Of the nine trials showing a response, two were between Lepperton and Inglewood, one at Tariki, one at Croydon, and three inland from Tariki.

A generally good response was recorded from Stratford and Cardiff down to Waitara and New Plymouth on the mountain side of the railway-line and thence between the coast and the mountain along to Tataraimaka. Beyond Tataraimaka, though responses were recorded in the majority of the trials to beyond Rahotu, the responses were not so definite. Three trials between Rahotu and the coast gave no response, while three inland of Rahotu did.

In view of these trials, the practice of replacing some of the phosphate by a proportion of potash for top-dressing purposes can be recommended over a considerable proportion of North Taranaki, and it is interesting to note that the use of potash is rapidly extending in this area, with very satisfactory results. No similar general response to potash has been recorded in trials in South Taranaki.

A great deal of the farmers' success centres round their ability to grow clover. In some districts the soil is too dry for maximum results, but in other districts where clover has been sparse in the past it has been found that the liming of the soil has resulted in the successful establishment of clover, and this operation combined with phosphatic manuring has resulted in good clover stands where formerly there was practically no clover present in the pastures.

Rotary Hoe clears Gorse and Broom.

MIXED gorse and broom growing up to a height of about 5 ft. on a roadside and along a fence line have been successfully cleared by means of a heavy tractor-driven rotary hoe. The hoe is able to make a complete clearance to within a few inches of the fence wires, and leaves only a small amount of trimming to be carried out by hand.

The hoe cuts the plants well below the ground-level, which results in an effective kill of the plants. The plants are not only killed, but are broken up into comparatively small pieces, thus completely destroying shelter for rabbits, which, in the locality in which this was carried out, are common. Destruction with a flame-thrower was also attempted here, but was only partially successful, in that, while the standing portions of the plant were killed, fresh growth soon commenced from the uninjured crown.

The photograph illustrates the result of the work carried out by the hoe. Seedling plants of many weeds such as fat-hen, gorse, broom, and thistle soon made their appearance after the hoe had completed its operations. At first sight this might appear to be a disadvantage, but it should be remembered that the same occurs when the existing cover is removed or the turf broken by either grubbing or burning. The use of the hoe for this purpose is much quicker and more economical than if the same work were carried out by hand, especially if it can be done when in the course of travelling from one paddock to another. The work is heavy, and a strongly built machine is therefore necessary.

After the rotary hoe has passed.

Seasonal Feeding of the Dairy Herd.

A PROBLEM requiring particular attention on dairy-farms in the late summer is that of maintaining the milk-supply. Especially in dry seasons, the feed problem becomes acute in early February, when pasture-production falls off rapidly, and unless some provision is made to supply extra feed to the herd milk-production will suffer in consequence. Any severe drop in production at this time of the year is seldom regained, as early calving cows are well advanced in their lactation and there is a natural tendency for the yields to fall.

On purely grassland farms a good vigorous lucerne stand will probably supply the necessary feed to keep the cows milking well. A paddock or two in which paspalum is the dominant pasture grass will also provide a fair amount of feed at this time and will considerably reduce the amount of supplementary feed required. Should it be necessary to feed out ensilage, an allowance of about 20 lb. per head per day is normally sufficient to keep up the milk-supply.

In those districts where supplementary crops are relied upon, it is advisable to have some roots or a forage crop available for this period. Lucerne, soft turnips, maize, and chou moellier are all suitable for this purpose, and all afford an excellent means of maintaining milk-production. Additional food at this period is of value not only to stock, but affords a much needed relief to the pastures, as much damage can be done to a sward by overgrazing it in an attempt to do without supplementary feeding. Overgrazing during periods of hot, dry weather decreases the cover afforded to the ground by plant leafage, and thus increases loss of moisture by evaporation. The crowns of plants are also exposed to the heat of the sun, and this greatly weakens the plant.

An ample supply of fresh clean water is absolutely essential to the health of the herd. Grass at this period contains less moisture than during the flush of growth, and cows thus drink more water. The troughs must be cleaned regularly, as water quickly becomes tainted and foul in the hot weather.

During the spring and early summer the Montgomeryshire red clover areas in South Canterbury demonstrated their ability to withstand dry conditions. This clover is well liked by stock. The seed prospects are good. Most of the areas were shut up about the middle of December, and have made good growth.

Soil Erosion in North Auckland.

A LARGE area of the pasture land in North Auckland consists of steep surface-sown hills and mountains; the rainfall is high, and the winds strong, and these conditions favour soil erosion.

The most obvious form of soil erosion is that caused by the rush of surface rain-water along the natural drainage channels of the land surface. This erosion can be stopped by filling in the heads of the channels with manuka and by planting trees, and is not usually of a serious nature. Another form of erosion, however, technically known as pin-point erosion, has a very serious economic significance, owing to the considerable reduction of soil fertility over large areas of the country which it brings about. Pin-point erosion is the removal of small quantities of the finer portion of the surface soil by the beating of raindrops, the run-off of surface-water during rain, and the wind during dry weather. The bad effects of pin-point erosion are two-fold; first, by the removal of the more available portions of the plant-food of the soil which is carried away in the finer particles, and, secondly, by the uncovering of the tender roots and crowns of the pasture plants and their subsequent exposure to the desiccating action of sun and wind.

Pin-point erosion has done very real harm to thousands of acres of North Auckland hill country, and the only remedy is to improve the pasture sward; a good sward of grass and clover reduces the eroding effect of rain beating, running water, wind, and stock tramping.

Improvement of hill-country pasture swards is not an easy matter; in the first place, clovers have to be introduced if top-dressing is to be payable, and it is somewhat difficult to introduce clovers into a tight bare hill sward of danthonia and brown-top. Experiments on the introduction of clover into hill pastures are now under way in North Auckland. Small areas of danthonia swards have been fenced, and white clover, subterranean clover, and *Lotus major* seeds will be sown in the cover of the rank grass in March. The seed will be sown with and without fertilizer, and seed will also be sown on grazed land. The object of the trials is to discover the best way to establish clovers in hill-country pastures, so that an economic system of hill-pasture improvement may be adopted and the serious effects of soil erosion lessened.

Production of Lotus major Seed.

ONE of the most remunerative, if extremely risky, undertakings is the production of *Lotus major* seed. The Mokoreta district, east of Wyndham, pioneered this sideline of Southland farming, and crops are still grown there. The Limehills district also produces fair quantities of seed, but crops are not limited to these districts, and may be found in widely scattered localities.

In Mokoreta the practice has been to sow originally about 3 lb. of *Lotus major* seed with the ordinary grass mixture. Generally this would be sown with a crop such as rape. In the following summer, twelve months after establishment, the first seed crop is taken, and this may be followed by a second seed crop in the succeeding year. By this time the *Lotus major* has diminished in the sward due to competition with the other species sown, and further crops are unpayable.

It has been found that it is never necessary to resow with *Lotus major*. When the time comes to plough this field in the rotation, it is put through the usual cropping programme, and *Lotus major* will establish itself in a dominant position for the first two seasons, as was previously the case when actually sown.

The average yield is about one bag to the acre, equivalent to 200 lb. of seed, but cases have been known where 700 lb. have been obtained.

The crop is cut with the mower, as a general rule, when the majority of the seed-pods are ripe. This is generally at the end of February or the beginning of March. The slightest touch of frost when the seed is setting is fatal to the seed crop, and this renders the crop a most risky one.

The crop may be threshed out of the paddock, the swaths being raked into windrows to dry. Care is taken to rake no more than can be threshed on that day. The windrows dry out quickly.

If the crop is stacked, the stack should be covered, as otherwise the material would let in rain badly.

In other districts *Lotus major* has been tried in purer sowings more for a specialized seed crop, but is is not often sown pure. In a number of cases a light seeding of cocksfoot is sown for the purpose of holding the crop up to the knife of the binder, which may be employed if the growth is sufficiently high.

Observations indicate a lower yield of small seeds this year in the Ashburton district. Wet weather during late December and the early part of January has been favourable for clover growth, and on the heavy to medium land the growth has been such that it in many cases outgrew the rye-grass and has made seed-production difficult. In some cases, instead of attempting to save seed, the fields have been cut for hay. On the old rye-grass pastures rust is absent, but is in evidence in the younger pastures.

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Covering of Hay-stacks.

FARMERS often neglect to cover their haystacks from the weather, and frequently rain may damage 25 per cent. of the hay in an uncovered and badly built stack, causing a direct loss of £8 to £10 per stack. Well-built and properly wired down stacks will turn a great deal of rain, but if a stack is to be kept for some time it is always as well to cover it. In stack-building the centre should always be kept well hearted up, and on completion the sides, ends, and roof should be carefully raked down. In topping off a stack it is quite a good plan to finish off the roof with freshly mown green material to a depth of 3 ft., bringing this green stuff well down over the sides; lightly rake down, and wire securely. Wire-netting in place of fencing-wire and placed along the full length of the top of the stack and weighted down is an excellent method of keeping the top secure.

When haystacks are likely to stand for any length of time, they should be covered. Thatching with rushes was a common practice at one time, but the difficulty in procuring rushes, and the amount of labour and time involved in doing the work satisfactorily, has put this method out of vogue to a great extent. The use of manure-sacks for covering haystacks is fairly common, but they are not very satisfactory, as the sack covers rarely last a season; the life of the covers may be extended to two or three seasons if the sack covers are soaked in a solution of bluestone (2 lb. to 20 gallons of water).

Many farmers now use corrugated roofing-iron to cover their stacks, and this material certainly makes the most satisfactory cover. Sometimes only the ridge is covered, but complete covering is the best method. In covering haystacks with roofing-iron, secure wiring down is essential. When commencing to build the stack, lay single wires with loops at each end at 10 ft. intervals across the bottom, and allow the ends to protrude 2 ft. on each side of the stack (the ends are put out of the way by placing under a sod whilst building is in progress). When building is completed, 6 in. by 2 in. timber is placed above the eaves lengthways along each side of the stack and also on the top of the ridge, and the beams bolted together. Wires are then taken over the stack and attached to the wires previously placed under the stack and strained tight and thus holding the beams tight; short wires with weights are usually attached to the eave beams before the wires are finally strained. The top is then covered with 10 ft. roofing-iron. The over wires may be re-strained at any time as the stack settles. Another method of building and covering with iron is to make the stack with a lean-to roof (a stack 16 ft. wide and 38 ft. long would give a fall of 2 ft.

Harvesting of Potatoes and Onions.

POTATOES are ready for digging at any time after the top ceases further growth. The longer they are left the larger the crop and the tougher the skin of the potato. Potatoes for immediate consumption can be dug early, but for storage it is better to dig them at a later stage of growth. In wet climates where late blight is prevalent, early digging is often enforced by its appearance. Also in wet climates, second growth often forces early digging. Potatoes dug in the autumn should be bagged immediately after digging, because at this time of the year the moth of the potato caterpillar is numerous and will quickly lay its eggs on tubers left on the ground.

Onions should be kept well weeded right up to harvesting. If a wet summer is experienced, any weeds left are liable to grow rapidly and interfere with drying operations. The ripening of onions is generally uneven, and any onions that keep growing can be encouraged to ripen off by bending, but not breaking, the stem of the plant. When the majority of the onion tops are withered and dead, harvesting operations should commence. The onions should be pulled or wheel-hoed from the bed, the soil shaken off the roots, and the onions left to dry. After a few days in the sun they should be raked into rows, the best implement for this purpose being the wooden hand hay-rake. The roots should then be cut off, and the tops clipped to within 1 in. of the onion. The onions should be left till the clipped necks dry out. In the meantime, if rain intervenes, the rows should be turned during fine spells until the onions are dry. The onion is not ready for storage until the neck is thoroughly dry.

Ewes for Fat-lamb Production in the Waikato.

THE annual drafts of breeding-ewes from the East Coast and Taihape districts are now arriving in the Waikato. Transport facilities from these districts have improved considerably during the past few years, and sheep are now transported without undue loss of condition.

Breeding-ewes from hill country where little if any top-dressing is done require careful management when they arrive on the intensively managed top-dressed grassland of the Waikato fat-lamb farms. The ewes should be pastured on comparatively short feed for a few days until they are thoroughly rested after the journey. Care at this stage assists in curtailing digestive disorders to a minimum. When they have rested, a change to a fresh pasture is recommended, as this assists in flushing the ewes. Flushing is important, as it increases the lambing percentage, makes lambing comparatively short, and reduces the number of late lambs. Dipping should be done at least a fortnight before the rams are put out, which is usually done in the last week in February or early March. Dust-blindness is common in ewes at this time of the year, but if placed in fields with adequate shelter the ewes quickly recover.

Clover Establishment in North Auckland.

THE lack of successful establishment of clovers, especially white clover, in a pasture may lower subsequent pasture-production. Indifferent clover strikes may even occur on good land, but on the poorer classes of land the lack of clover in a newly sown down pasture shows up most rapidly. After the first flush of the grasses, due to the preparatory cultivation, the grasses, particularly rye-grass, do poorly; many plants die out, and low fertility demanding grasses and weeds take their place.

Although grasses may strike fairly well with indifferent cultivation, to obtain a rapid and complete establishment of clovers, and consequently a pasture balanced in grasses and clovers, careful consideration should be given to laying-down methods. In preparing the seed-bed, cultivation should aim to produce a clean, sweet, moist, fine, and firm seed-bed at the time of sowing, as well as to enable the seed to be sown whilst the land is still warm. Late cultivation, caused usually through waiting for a crop to be fed off, generally results in a dry seed-bed, and sowing is then often delayed until the late autumn until after heavy rains have fallen. Although a good strike of clover may then occur, many of the plants fail to survive the wet, cold, and maybe frosty conditions of the following winter. Early cultivation particularly including a summer fallow, during which the land is worked with the disks and harrows, will permit the seed to be sown as early as February or March. Then, with the moist seed-bed, light rain will start the seed, and the reserves of moisture in the soil will carry on the plants. Fineness throughout the depth of the seed-bed is most important. A fine surface with the large clods beneath prevents the rise of moisture from the subsoil. Firmness is particularly required by clovers. Natural consolidation such as can be obtained by summer fallowing is definitely superior to that which can be obtained by any implement. Forced consolidation makes the soil firm at the top but leaves it loose underneath. On light land the roller is essential even with a summer fallow. The cultivation work cannot be hurried.

Phosphates are essential for clovers. Superphosphate, at the time of sowing, applied at the rate of 3 cwt. per acre acts rapidly, and by promoting root development quickly pushes the clover seedlings along. Soils lacking in lime do not grow clovers vigorously. On all lime-responsive soils, 1 ton of lime per acre can be applied with beneficial results about three weeks before sowing. On most soils a further application of super at the rate of 2 cwt. per acre applied in the following spring will considerably assist in firmly establishing sufficient clover in a new pasture sward.

On the poorer soils, particularly the gum land silts and clays, establishment can be greatly assisted by treating the seed with a culture of bacteria, which promote the development of the nodules on the roots of the plants. Trials during recent years have shown very beneficial results. The culture can be obtained through local officers of the Fields Division, and the seed is easily inoculated. Full directions are printed with each bottle of culture, the cost of which is only a few pence per acre.

The strain of clover sown has an important bearing on the clover content of pastures. Certified seed consists of strains which are decidedly superior in every way to the ordinary commercial lines. Italian rye-grass, especially if included in a mixture sown on heavy land which is inclined to be wet during the winter and early spring months, thus preventing suitable stocking, produces a very strong growth and tends to smother clover-plants.

With due attention to the foregoing points a successful establishment of clover can be looked for in the early stages of the pasture. Without good and rapid establishment of white clover, rye-grass will not grow.

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Litter-feeding.

THE production of good weaners of 40 lb. weight or better at eight weeks can only be accomplished by supplementary feeding. From the time the litter is about three weeks old, the sow's milk alone is insufficient, and by the use of the creep method of feeding the young pigs have access to supplementary feeds throughout the day, making up for the lack of the mother's milk. This continual access prevents them from alternate overeating and fasting, which often sets up digestive troubles.

Young pigs can be successfully reared to good weaning weights on a variety of feeds, providing the feeds are easily masticated and highly digestible. Skim-milk alone or skim-milk and curd have been found to give good results, providing the troughs are kept clean and the skim-milk and curd are not rotten or excessively sour. Whole maize, even when soaked, has not been found satisfactory; the young pigs are unable to masticate it, and consume skim-milk instead.

The advantage of feeding meals is that, providing they are kept dry, they remain sweet and do not need replenishing so often as skim-milk and curd. The provision of skim-milk at all times must be stressed, however. Trials with skim-milk and meals have shown that, given choice, the young pigs consume about two-thirds of their creep feed as skim-milk. Litters which average 40 lb. to 45 lb. at eight weeks will consume about 13 lb. of meal and 20 gallons of skim-milk per weaner.

The following table is an approximate guide to the quantities of skim-milk and meal consumed per piglet from three to eight weeks of age :—

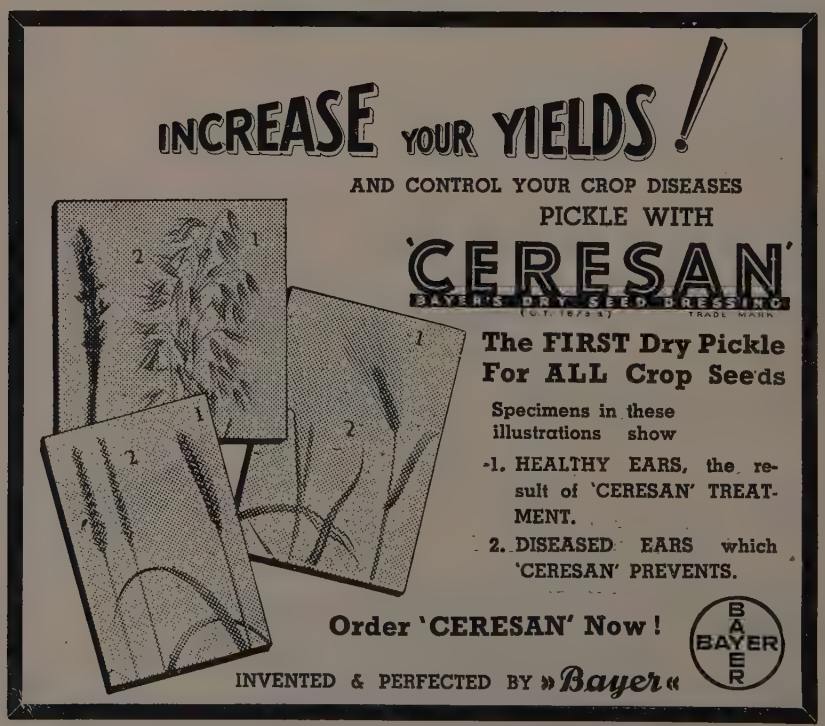
Age, in weeks ..	3–4	4–5	5–6	6–7	7–8
Skim-milk (pints)	8	15	30	40	70
*Meal (lb.) ..	0·5	1·5	2·5	4·0	4·5
Skim-milk only (pints) ..	14	27	50	75	100

* Pollard and meat-meal mixture or meat-meal.

White Butterfly in South Otago.

THE reappearance of the white butterfly in many districts south of Dunedin is causing a great deal of consternation among farmers. Its conspicuous nature is earning for it the bad reputation it gained in the North during its early appearance there, and the butterfly itself is being credited with damage to all kinds of farm crops. Actually statements of damage to silver-beet and plum-trees have been reported. There is no doubt that at present it does not occur in sufficient numbers to cause the extensive damage for which it is blamed. So far very few reports on the actual caterpillar or the pupa have been received, but, nevertheless, wherever the butterfly is seen either in singles or in twos and threes reports of extensive damage are forthcoming.

Before the damage can be considered extensive, much more definite evidence must be found. Obviously many of the reports are due to a lack of knowledge of the habits of the pest, but they tend to show that an active interest is being taken in the occurrence of the pest.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Subterranean Clover on Sand-dune Country.

ALONG the west coast of the Wellington Province stretching from Paekakariki to Wanganui and on to Patea lies a belt of consolidated sand country penetrating inland in places upwards of ten miles from the coast. While the ordinary methods of pasture establishment, using good perennial types of rye-grass, white clover, and cocksfoot, with phosphate top-dressing, have been successful in grassing the extensive areas of better type flats and swamps following drainage, the extensive areas of drier sandy flats and sandy ridges have proved a much more difficult problem.

Here the use of subterranean clover is rapidly extending, due to the very satisfactory results being obtained by broadcasting a few pounds of subterranean clover per acre on the present poor sward of *poa pratensis*, sweet vernal, &c., which is in many cases invaded by bracken-fern, and lupin, &c.

The subterranean clover must be top-dressed to give results, but the establishment of this clover is making the top-dressing worth while. Many farmers who have developed the better portions of their holdings, particularly the wet flats, are now extending operations by the use of subterranean clover to these less consolidated ridges and drier flats. In other cases areas of ploughable flats and low ridges which dry out too severely for rye-grass and white clover to thrive are being developed by including 2 lb. to 3 lb. of subterranean clover in the grass-seed mixture.

FIG. 1.—Typical dry, sandy flat developed for dairying with subterranean clover.

Fig. 2.—Typical sandy ridges invaded by bracken.

Feeding the Ewe Flock.

IN Southland with the ewe flock the great majority of farmers prefer set stocking to the shifting of ewes and lambs. These are usually left in the same paddock from immediately after lambing until weaning. The number of sheep carried in each paddock requires some adjusting from year to year, but it is noticeable that in a short grass year better drafting results off the mothers are obtained.

It is also noticeable that those farmers securing excellent results from the certified type of rye-grass never let their pasture get away from the stock—the sheep are always on top of the grass all the time.

To do this generally means shutting up part of the farm for hay or seed, but it spells all the difference between success and failure with the lamb draft.

In many districts the sowing of the autumn green-feed crops is an important operation. Algerian and Dun oats or Italian rye-grass are the crops mostly in favour. The Algerian oats make good autumn growth, and in the spring come away very rapidly. New season's seed at times gives a poor germination, so farmers should make sure that germination is satisfactory before sowing their crops.

Fig. 3.—Close-up of cow pasture in Fig. 1 beyond belt of trees; subterranean clover sown in grass-seed mixture.

Fig. 4.—Close-up of subterranean clover amongst the bracken established by surface sowing and top-dressing.

Insect Pests in Cabbages.

YOUNG cabbage-plants in the seed-bed must be watched continually in the summer and autumn for signs of attack by insect pests such as aphis, and the caterpillars of the white butterfly and diamond-back moth. These pests are easily controlled in the seed-bed by sprayings of nicotine sulphate preparations at about four teaspoons to the gallon every second or third evening.

After planting out, spraying to combat insects is more costly and laborious, and then the cheaper and more lasting arsenate of lead at 1 lb. to 50 gallons of water should be applied at weekly or fortnightly intervals. If this does not effect a sufficient degree of control, an occasional spraying with nicotine sulphate must be given.

Benefit of White Clover.

THE effect of a good type of white clover on the growth and palatability of certified perennial rye-grass is well exemplified on a strain trial in the Ashburton district. On two neighbouring plots one was sown with mother-seed white clover, and the other with an ordinary type of white colver. The same amount of certified perennial rye-grass was sown in each plot. At the present time the plot sown with mother-seed clover is in good condition with a balanced mixture and is well grazed, while the other is practically all rye-grass which has gone to seed, and there is little evidence of the area being grazed by the sheep. The trial has been down for approximately two years.

Lea land is greatly benefited by autumn ploughing. The sod has the opportunity of becoming broken down. The grass and roots decompose, and become incorporated in the soil. Clay soils are especially benefitted by early ploughing.

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Certified Giant Rape.

TRIALS in the Manawatu, Wanganui, and Hawke's Bay districts in which certified giant rape was compared with commercial broad-leaf Essex rape have demonstrated a remarkable superiority in yield from the giant rape.

The accompanying photograph shows a crop of giant rape in the Manawatu. A crop of broad-leaf Essex rape grown in the same trial was only knee-high, while the giant rape was waist-high. When fed off, the sheep, in this case as in other trials, showed a definite preference for giant rape.

Giant rape is the result of a selection made by the Agronomist, Plant Research Bureau, and certified seed of this variety is being produced in New Zealand.

The second of the series of articles on fertilizers will be published in the March issue of the *Journal*.

Giant rape on the property of J. B. Crystall, Kairanga. [*H. Drake, photo.*

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Section for Irrigation Areas.

Contributed by Officers of the Fields Division.

Irrigation of Potatoes.

AFTER planting, there is usually sufficient moisture present in the soil to allow the plants to produce at least 6 in. to 10 in. of growth. The crop will be cultivated and moulded up once, or more often, before irrigation commences, when the water will be run along the furrows between the rows. Consequently, they will be required to be planted in the direction of the fall of the land if on reasonably flat country or on a line of a gentle fall if on a hillside.

At the first sign of steadying-up of the growth of the crop, or before it commences to wilt, irrigation water should be applied, and once irrigation commences it must be carried out steadily during the whole growing period.

In Central Otago, once irrigation commences a vigorous growth is produced, and this must be maintained by irrigating generally about every two to three weeks for, say, two or two months and a half.

As soon as possible after irrigation, or as soon as the land will carry a horse, the drills should be horse hoed and a mulch produced. This can only be carried out a few times, as the potato shaws will soon meet between the drills and provide cover to stop excessive evaporation.

It has been stated that irrigation of potatoes should cease after the plants have finished flowering, but that has not been borne out in practice here.

Potatoes under irrigation, Clyde.

The essentials of irrigating potatoes appears to be once irrigation starts the soil must be kept moist and a vigorous healthy growth maintained during the growing season. Any check to the crop at this season due to lack of moisture appears to commence ripening of the crop, and with subsequent irrigation or rain a second growth is produced.

Mangels under irrigation, Clyde.

Seed-heads should be removed from pampas plantations in January or early February; the seed-heads appear early in January, and in the young stage are tender and easily broken by hand. The removal of the seed-heads allows the plant to produce a maximum of leaf growth; if the seed-heads are not removed, leaf growth stops after the seed-heads appear.

Many arable farmers are looking for a short-cut in connection with the eradication of large twitch. The most satisfactory method is to summer fallow the land, and to give as much working as possible while the weather is dry and hot. The earlier in the summer that this work is undertaken the better will be the results.

Carriage of Water.

THE common method of carrying water across a gully is by pipe-line, frequently called a syphon.

In the old gold-mining days the miners, who were the pioneers of irrigation in Central Otago, had not access to or could not afford pipes, so they carried water across gullies, &c., by flumings.

The accompanying photograph is of a fluming constructed last year by a local farmer and his son, along the lines followed by the miners.

Poplar poles were planted at regular intervals and encouraged to grow. These were then used to carry the galvanized-iron sheeting with which the fluming was built.

Close-up of fluming, showing construction.

News!

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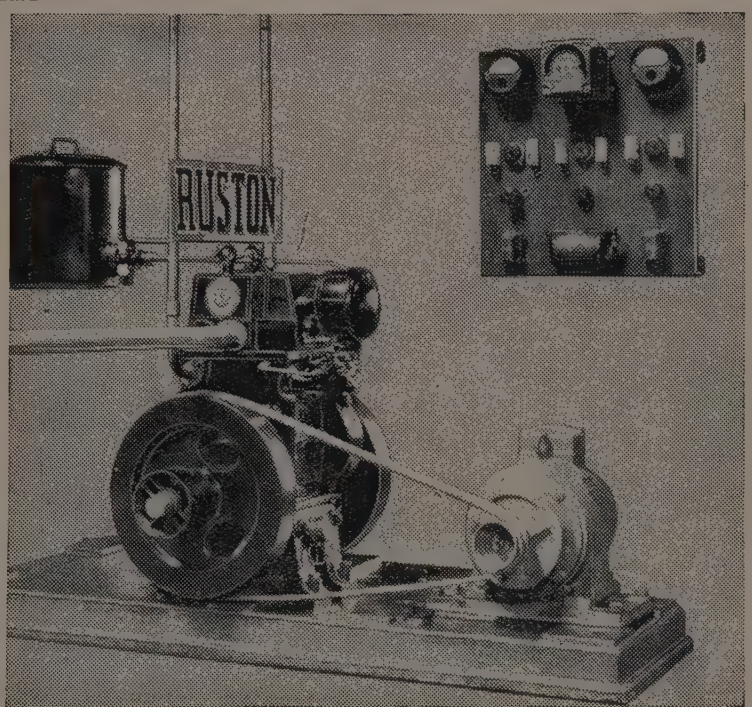

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Horticultural Instruction.

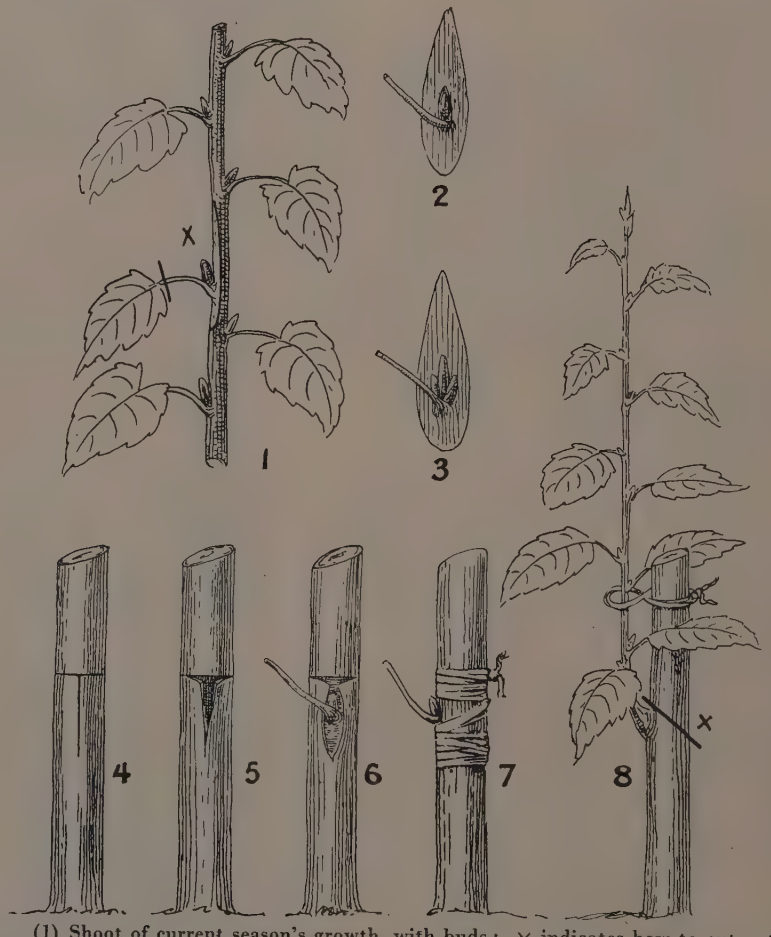
Contributed by Officers of the Horticultural Division.

The Orchard.

BY the time these notes appear, spraying operations for the season will be practically finished, although during some seasons the humid weather conditions prevailing during February are often favourable for the development of a late infection of black-spot, whilst if hot, dry conditions continue red mite may still become troublesome. Therefore it is necessary to keep a good watch, and should any indications of black-spot be detected it will be necessary to apply a further sulphur spray to keep it in check. As the trees are heavy with foliage at this time thoroughness of application to ensure that all fruits receive a coating of spray is essential. The further use of summer oil for the control of red mite, as previously advised, will be necessary should this pest become troublesome. Watch the trees, and as soon as the mites are detected apply the oil, not waiting until the pest has increased to the extent of bronzing the foliage. If this is done it is possible that one thorough application of oil at strength 1 to 100 will be sufficient to cope with the pest, otherwise a second spray will be necessary about seven or eight days after the first in order to destroy the majority of the mites.

Budding.

The reworking of fruit-trees by means of budding may be proceeded with at this time of the year, when little difficulty should be experienced in lifting the bark for the insertion of the bud. Buds for working should be taken from healthy trees and should be fully developed, but not too ripe. They are usually found round about the middle of the current seasons growth from which the buds are taken. Wood-buds must be used, and in the case of peaches, nectarines, &c., it is advisable to take treble buds. Wood-buds are easily distinguished by being more pointed and thinner than fruit-buds.



(1) Shoot of current season's growth, with buds; × indicates how to cut out bud; remove leaf at line /. (2) Single bud ready for insertion. (3) Triple bud ready for insertion. (4) Incision made through bark of stock. (5) Same with bark opened. (6) Same with bud inserted. (7) Bud tied. (8) Growth from bud tied to snag of stock; snag to be cut off at × after midsummer.

Bud-sticks from which buds are taken should not be allowed to become dry or wilted, it being advisable to perform the operation of budding as soon as possible after the bud-sticks have been taken from the tree.

Although the operation of budding is by no means hard, care must be taken to see that the work is done neatly, the buds are cut from the stick cleanly, the incisions in the stock are made with no rough edges, the buds are firmly pressed

into the incision in the stock to ensure close contact, and the whole properly bound, both at the top and bottom of the bud, so that neither wind, rain, or sun can have any detrimental effect on the buds inserted. An examination of the buds should be made about a month after the operation, and if it is found that the growing stock is causing the ties to become strained they should be severed by running a knife through them at the back of the stock, but leaving them as a protection for the inserted bud.

Handling Fruit for Export.

The necessity for making several pickings when dealing with fruit for export has been emphasized in previous notes in the *Journal*. Further notes, however, on the handling of the fruit after picking may not be out of place. During a heavy producing season growers are apt to try and rush the work. Although speed is necessary, it should not be so great as to have a detrimental effect on the final out-turn of the fruit. Rushing through the grading and packing usually results in very little attention being given to the standards required for export, while the neatness and attractiveness of the finished article may be impaired to such an extent that the fruit will not compare favourably with the fruit from other countries and coming on the market at the same time.

The packing-shed should be reserved for export fruit only, leaving as much space as possible for the workers. A conglomeration of empty cases, rejected fruit, &c., often means double handling and unnecessary expense. A careful study of the grading and packing regulations will be of great value, and may save much trouble and possible rejection at the inspection point. It should hardly be necessary to draw attention to the necessity of keeping grading-tables, sizing-machines, packing-bins — in fact, all apparatus connected with the handling of the fruit—in a clean condition to minimize the risk of bruising the fruit and the possible entrance of fungal rots.

The proper wrapping of the fruit, the consolidation of the pack as each layer is put in the case, and the building-up of a correct bulge should be the aim of every packer. Those responsible for the lidding and stamping of the case should exercise care to see that no fruit is cut or bruised during the operation, and that all the required details are stamped on the case in a clear and decisive manner.

—George Stratford, Orchard Instructor, Motueka.

Citrus Culture.

IN most, if not all, of the citrus areas the rainfall during the past two months—December and January—has been considerably below average, and relatively high temperatures have obtained. Such climatic conditions encourage many of the insect pests which attack citrus, and, where present, preventive measures should be taken this summer to control them.

Red Scale (Chrysomphalus Aurantii).—This pest increases at an alarming rate during hot and dry atmospheric conditions. In an average season two applications of summer oil at a dilution of 1–33, when thoroughly applied at suitable periods, will usually effect a satisfactory control; however, in seasons such as the present a third, and possibly a fourth, application may be necessary to ensure adequate control.

Citrus Red Mite (Paratetranychus Citri).—In seasons such as the present a careful watch should be kept for the appearance of red mite. If not controlled, this pest may cause extensive injury to the foliage. Control is readily obtained by the application of summer oil 1–100.

Leaf-roller Caterpillar (Tortrix Postvittaria).—In recent years increasing losses have been sustained by the depredations of leaf-roller caterpillar, and in dry seasons even greater losses may be expected where adequate control measures are not adopted. The fruit and foliage of the orange is most susceptible to attack. The young caterpillars, which become active shortly after the fruit has set, appear to cause the greatest damage to the fruit. At this early stage many of the fruits are injured near the stalk-end, which causes the fruit to drop. This caterpillar may continue to cause damage throughout the summer and autumn months. Control can be effected by spraying at three-weekly intervals with lead arsenate (powder) 1½ lb. to 100 gallons.

Citrus Thrips.—The measures recommended for the control of citrus thrips appeared in the citrus notes for December last. Attention is again drawn to the serious injury likely to be caused by this pest in dry seasons where adequate control measures are not employed.

Lemon-tree Borer (Oemona Villosa).—The eggs of this longhorn beetle are laid on dead twigs, branch stubs, or places where the bark has been removed; consequently the most effective measures to prevent borers from entering the limbs is to keep the trees free from dead or exposed wood. All wounds made in pruning should be immediately covered with a dressing of the bitumen-emulsion type. Light wood that has become infected should be cut out and burned. Where the borer has gained access to valuable limbs an attempt should be made to locate and kill the larva by probing with a copper wire. The injection of benzine or kerosene into the burrows is believed to be injurious to the tree, and therefore cannot be recommended. However, where this method is employed the liquid should be used sparingly and the tunnel-mouth plugged with soap to prevent the fumes from escaping.

Spraying.

Failure to effect a satisfactory control of pests and diseases is not infrequently attributed by the grower concerned to inferior quality of the specific applied. In reality the fault is usually due to inadequate coverage. To ensure complete spray coverage the following points should be observed:—

(1) The tree must be sufficiently open to enable the spray to reach all parts.

(2) The spray should be directed to the under-side as well as the upper-side of the foliage.

(3) Adequate pressure (300 lb. or more per square inch is desirable).

(4) Thoroughness of application, preferably from four sides of every tree.

Budding.

March is one of the most suitable months in which to bud citrus trees, provided there is sufficient sap flowing to cause the bark to life readily. Growth from buds inserted in the autumn can not be expected until the following spring.

—P. Everett, Orchard Instructor, Gisborne.

Viticulture.

As mentioned in last month's notes, particular care should be paid to ventilation and to freeing the bunches from cracked and diseased berries. Scalding of the leaves and berries is apt to occur at this period in vineries that are not opened up early in the morning in order to allow the moisture which accumulates on the foliage and grapes during the night to evaporate. This is particularly noticeable where the leaves are allowed to grow too near the glass. To avoid this the rods should be hung at least 18 in. from the glass, and this is best done by hanging the rods from the wires by fairly thick wire hooks, which do not, like some materials, harbour mealy-bugs and other pests. The hooks, moreover, are permanent, and the rods can be released from them with ease for cleaning and pruning.

Where the foliage is very thick above white varieties which are approaching ripeness some of the leaves can be removed gradually to allow more sunlight in and so obtain that golden tinge so much admired on these varieties.

The Vineyard.

Weather conditions have up to the present been much more favourable for grape-growing than in the average year, and decidedly better than in the two previous seasons. This makes an early vintage of well-ripened and sound grapes probable. Preventive measures for keeping the vines free of disease should not, however, be neglected. Provision should also be made for assisting the grapes to ripen by keeping the weeds down and allowing all possible heat to radiate from the soil direct on to the bunches. Leaves between the soil and the bunches may be cut out, but on no account are the grapes to be exposed to the direct rays of the sun; black grapes are particularly apt to suffer in quality under such conditions. A free circulation of air should be encouraged.

A second topping may be done, cutting off any new growth which has appeared since the last operation, taking care to avoid damaging the rods grown for replacing the previous season's fruiting-rods at pruning-time.

Keeping off the Birds.

A few varieties may be ripe towards the end of the month, but the main crop generally ripens in March, when every means should be taken to save the grapes from the birds, the worst pest we have to contend with. Shooting to kill, using dust shot or No. 12 shot, is an effective method of keeping down these pests. Where, owing to the proximity of houses or roads, it is not safe to shoot, kerosene or other suitable tins with a few stones in them hung on wires over the vineyard, arranged so that they can be agitated from one or more points of the vineyard, may be utilized. A certain number of growers use old fishing-nets with ½ in or ¾ in meshes. Others unroll wire-netting along each side of early ripening varieties, attaching the wire to the top edge, and when that variety has been picked move it on to later varieties as they approach their ripening-period. As a rule the birds only attack ripe or nearly ripe grapes, though last season, owing probably to a scarcity of other food, they played havoc with unripe as well as ripe grapes. A more expensive but effective and permanent job is to cover the whole vineyard with wire-netting at a height of about 8 ft., high enough for horses or a tractor to work under.

A point which unfortunately, either unintentionally or otherwise, is overlooked when gathering grapes, whether they are intended for table purposes (except for jelly-making, when they make better jelly if slightly under-ripe) or for wine-making, is that they should be ripe.

Some varieties, such as the Albany Surprise and Gros Maroc, appear to the uninitiated to be ripe, when they are far from ready. The public is often induced to purchase these apparently early grapes and pay a higher price than their condition warrants, with the result that the demand slackens. The higher prices which should be obtained for early ripe grapes coming from better situated or better cared for vineyards or vineries do not reap the benefit of their legitimate advantages.

For making wine ripe grapes are essential, the difference made by leaving the grapes on the vines a few days longer until they are ripe often results in the difference between a good and a second-rate wine.

With a little experience ripe table grapes can easily be distinguished by their appearance and flavour. For wine-making it is necessary to obtain more accurately the sugar and acid contents of the fruit. The density, which corresponds approximately to the sugar contents, can be ascertained by a mustimeter, saccarometer, or densimeter (Baumé, Brix, or Saleron, and others), and the acid by the acidimeter, using a titrated alkaline solution as is practised in butter and cheese factories in New Zealand.

The Cellar.

Preparation for the coming vintage should be completed without delay, including the overhauling of the cases and vessels used for transporting the grapes, if not already attended to.

The bottling of all wines estimated to be required for the next three or four months should be terminated before vintage begins. Wines bottled during vintage are apt to set up a slight fermentation, due to the innumerable ferments and spores present, and become cloudy and otherwise unsaleable.

—J. C. Woodfin, Vine and Wine Instructor, Te Kauwhata.

Tobacco-culture.

THE month of January has been ideal for the growth of cigarette tobacco. A few growers commenced curing lower leaves in December, and January found all growers busy harvesting. Some very fine leaf has been cured.

Occasional heavy rains during the month have been very beneficial to the plantations, and leaf has filled out well.

The staffs of instructors working on behalf of the various contracting manufacturing companies have been very busy visiting the growers' kilns at all hours of the day and night and giving advice and instruction where needed. Growers are all in good heart, and looking forward to a good profitable season.

The announcement by the Minister of Agriculture of the prices received for the export consignment to London was a cheer to all growers, as it again proves the value of New-Zealand-grown leaf on the world's market. This is good news to all tobacco-growers, apart from those actually participating in the export business.

The Government purchase of land and machinery for the erection of a factory for the receiving, grading, reconditioning, and packing tobacco for export has further tended to encourage growers throughout the district.

The factory and plant will be ready for the coming season's requirements.

—C. Lowe, Tobacco Instructor.

Vegetables, Small Fruits, and Flowers.

Contributed by the Horticultural Division.

THE full enjoyment and economical use of many vegetables depend not only on a wise selection of varieties and careful culture; sound consideration must also be given to harvesting and storage if there is to be no loss in quantity and quality, and the stocks are to be available over a maximum period. Under most conditions here such crops as celery, parsnips, salsify, Jerusalem artichokes, autumn-sown carrots, and beet may be left in the ground during winter with quite satisfactory results, and lifted in dry weather, as required, until about the month of August, when growth is about to recommence. What remains must then be lifted and stored where the conditions are cold, well ventilated, and not too dry. Main-crop carrots, maturing about the month of April, split if left in the ground and become coarse and fibrous, as do main-crop beet maturing at that time. These should be lifted in fine weather as soon as they mature and given the storage conditions before mentioned.

A lean-to shed with a southerly aspect is often a suitable place for storing produce of this kind, especially when shaded by plantation trees and having ample means for ventilation in the higher part of the roof. Such a place is also suitable for potatoes stored in bins, sacks, or boxes if it is clean, well drained, and dark; but not so dry as to cause the tubers to shrivel. Considerable losses from decay occur if the stocks are contaminated by the presence of decayed tubers or waste carried over from a previous season, in the store or its vicinity. This can readily be avoided by the methodical disposal of decayed waste at all times and a thorough annual clean-up of the store, which may very well include a careful spraying of the interior with a reliable fungicide.

Losses from Decay.

Losses from decay may also occur through infection caused by decayed tubers overlooked when bagging up in the field; or an abundant crop, to all appearance sound, may be placed in the store and in a month may be in a useless condition due to the attack of the potato-moth (*Phthorimaea operculella*). This attack, which is most likely to occur in warm, dry localities and seasons, may be avoided by picking up and bagging the tubers the same day as they are dug, and placing them in a clean store. In this way the night-flying, egg-laying moth is unable to deposit on the tubers those eggs which later hatch out into caterpillar larvæ which tunnel the flesh and make the tubers an early prey to organisms of decay. Doubtful stocks should be picked over after a month or two in storage, and, if infection is fairly extensive, they should be used up as soon as possible.

Large quantities of potatoes stacked in a compact manner are liable to heat and sprout, especially in warm districts and in a store where attention to ventilation is neglected. In such localities they may be stored satisfactorily in slatted bins to a depth not exceeding 3 ft. or 4 ft., but in colder districts 6 ft. may be a maximum depth so long as good ventilation is provided, except when there is danger of injury through frosts.

Where stocks are large and storage accommodation limited a quantity for late use may be satisfactorily held in a pit or clamp outside if the tubers are quite sound. For this purpose a well-drained, cool position should be chosen and the potatoes piled as high as possible in a ridge, 5 ft. or 6 ft. wide, and as long as desirable. The tubers are then covered with clean straw to a depth of about 6 in., and to keep this in position it is covered with soil at least 3 in. deep. In doing this a trench is formed about the pit which will adequately drain it during wet weather. To allow surplus moisture to be given off and prevent the potatoes heating the pit should not be completely sealed for the first few weeks, but up to within a foot of the ridge only. When this object is achieved sealing should be completed and the depth of the soil covering increased as may be desirable. If these conditions are observed and the crop is carefully dug in fine weather as soon as ripe and allowed to harden off afterwards for a few hours before gathering it will be used to best advantage.

Storing of Seed Potatoes.

Special care is required in storing seed potatoes. They require light, without being exposed to the sun, and plenty of air. They are best stored in crates. If in sacks they should not be piled up, but a space left between each row to allow air to circulate. At intervals the sacks of seed should be turned bottom side up to ventilate and dry off. They are sometimes spread on the floor with satisfactory results, and special lots are spread in wooden trays stacked in tiers to sprout in preparation for planting. Any of these methods will prevent sweating and the formation of unseasonable, excessive, and useless growth. "Certified" seed should be obtained as soon as it is available and carefully stored in order to obtain the best results.

The onion crop requires somewhat similar storage conditions to that for the potato, the chief difference being a drier atmosphere. The bulbs should be lifted as soon as ripe (this is of special importance in districts inclined to be humid and warm) and placed in windrows, consisting of five or six rows of bulbs, until the tops wither completely. If wet weather is experienced the windrows are turned over by means of a wooden rake. When tops and roots have dried off the bulbs are trimmed with shears, bagged up, and placed in an open shed for a few weeks to cure thoroughly before storage or shipping.

When cured the bulbs are cleaned by removing the dry outer scales; bulbs which are split, have "thick necks," or are damaged in any way are removed and the remainder graded for size. They will then store satisfactorily if placed in a comparatively dry atmosphere and given thorough ventilation at all times except in wet or humid weather. If packed in slatted boxes they are stacked, like fruit, with 1 in. space between tiers

and rows to permit of circulation of the air; or they may be spread 6 in. or 8 in. deep on slatted shelves; or small quantities may be "strung" in the old-fashioned manner and hung in a dry airy place. This latter method is particularly suitable for shallots held over for another planting season. All bulbs of this class deteriorate very quickly in a close atmosphere.

Marrows or Pumpkins.

Vegetable marrows are best used in a green state when of a suitable size, but pumpkins, and what are known in America as winter-squash—such as the Hubbard varieties—should not be harvested until thoroughly ripe, but before they have been frosted. They are cut with a portion of the stem attached and left in the field to mature before carting. They must be handled and carted with care, as it is easy to injure them seriously at this stage. When they have been stored in a warm, dry, airy place for a few weeks their shells harden and they can then stand somewhat lower temperatures and rougher handling if that is necessary.

In the warmer districts, especially where there is also a heavy annual rainfall, the ordinary late potato crop is rather difficult; but the sweet potato, or kumara, generally grows well. For this and other reasons it is increasing in popularity in such areas. While the crop is best left growing as late as possible it must be lifted before there is any frost, or the tubers immediately under the crown are liable to injury. If frost kills the vines the kumaras should be dug immediately, as decay sets in on the dead vines and may pass down to the tubers. Digging must be done with the greatest care, as the slightest damage at this stage prevents the tubers keeping, and storage losses are due chiefly to faulty handling before curing. Curing, which occupies about a week, is usually done by gathering the tubers into heaps and covering them with sacks every night to dry them thoroughly before storage in a warm, dry chamber that can be ventilated in suitable weather. Small quantities may be kept successfully by storing in sand so long as it is perfectly dry.

In the southern States of America where sweet potatoes are grown on a commercial scale the tubers are stored in crates, stacked to allow ample ventilation and to enable the air to circulate through them, in chambers that are heated to a temperature of about 80° F. for the first fortnight or so of the storage period. When the roots are well dried off the temperature is allowed to drop to 55°, and is held there for the rest of the storage period, giving ventilation freely when weather permits. In this way, together with fresh vegetables, such as celery, savoys, cauliflower, broccoli, leeks, &c., also dry beans, pickles, and chutneys, the garden makes valuable contributions to the larder during the winter as well as the summer months.

Young Spring Onions.

To provide young spring onions at that season, when salads are so much in demand, a sowing should be made during the month of March—towards the end in the warmer districts. For this purpose the Rocca or Tripoli types are most suitable owing to their mild flavour and tender flesh. In warm districts with a considerable annual rainfall the sowing should be extended to also provide young plants for setting out in early spring that ripen their bulbs about the month of January, which is more satisfactory under such conditions than sowing the main crop in early spring as is done in the drier districts. The land selected for the seed-bed should be well drained and thoroughly cleaned of weeds by shallow cultivation for some time before sowing.

When the tomato crop is of considerable importance it is sometimes advisable to select the seed under local conditions, so that while the fruit is of a type suited to one's requirements the plant is also thoroughly acclimatized. Time and careful consideration should be given to the selection of plants from which seed is to be taken; they should be free from serious disease, including mosaic, of good constitution, and carrying crops that are as satisfactory as possible in regard to quantity and quality. Fruit that is likely to be coarse or small should be removed from the bunches and the remainder allowed to ripen naturally on the plants, which should be flagged to enable them to be readily recognized. When the fruit is ripe it should be cut open and the pulp dropped into a vessel containing a little water. This should be stood in a warm position, and as soon as fermentation commences it should be poured into a strainer and washed well under a tap of running water until clean seed only remains. The seed is then placed in a position where it dries quickly, meanwhile stirring it frequently to prevent the seeds sticking together. If the seed is stored afterwards in tins, or other airtight containers, it is as well to redry it after a short period to make sure of its condition. It should then retain a high germination percentage for five years at least. When conditions are favourable for a good seed harvest a generous supply should be taken to provide against contingencies. Another method of saving tomato-seed is to scoop the pulp from the fruit and let it drop on to sand that is quite dry and has been passed through a fine sieve; the mixture should be well rubbed through the hands for some time, and then spread to dry. When it is dry it should be rubbed again and sieved to remove the sand.

The Homestead Garden.

Where trees and shrubs for shelter or ornamental purposes are to be purchased a visit to the nurseries should now be made and the requirements carefully selected and ordered for delivery as soon as they are ready for removal, which will generally be towards the end of the month of May. They can then be planted at once with great advantage or they may be "heeled in" and so be ready for planting whenever the weather or other circumstances permit.

Most kinds of spring flowering bulbs are planted during the first four months of the new year; but the earlier this is done the better so that they may be well rooted before winter sets in. Exceptions are hyacinths and tulips, which appreciate a period of warm storage; also anemones and ranunculus tubers. These are usually planted during the month of April, and are all partial to a soil well supplied with lime. Many plants of this class provide an early display of blossom of excellent quality with little labour and so deserve every consideration. In addition to high culture in special beds, many kinds may be planted in grass or the foreground of shrubberies, where they will flourish for many years before requiring attention.

Established lawns may now be given any extra attention that is necessary, such as returfing worn places and loosening up hard places with a fork; or thoroughly raking the whole area and, after cutting, sowing such grass-seeds as may be desirable before applying a light top-dressing composed of fine soil and manures. Where the lawns have been in constant use for games this attention is urgently needed and should be commenced as soon as the playing-season is finished, so that the most may be made of the interval between seasons, which is generally all too short for this purpose. A sharp look-out should be kept for insect pests. This is the season when serious damage may be done to lawns by the common earth worm when numerous, or subterranean caterpillar (*Porina*), or grass grub (*Odontria zealandica*). Damage is best avoided by giving the matter prompt attention as soon as the attack is perceived.

—*Wm. C. Hyde, Horticulturist, Wellington.*

Work for the Month in the Apiary.

Use of Bee-escapes.

FOR removing honey late in the season the beekeeper may find it necessary to bring into use bee-escapes. These escapes enable the honey to be removed without causing any disturbance. By the employment of the Hodgson escape device there is less likelihood of causing robbing, with its attendant evils.

More especially will the escapes be found advantageous when removing section honey from the hive. There is far more risk in removing sections than extraction-combs. When the colony is disturbed, the bees will at once start to fill their sacs, and often the cappings of the sections are punctured in order to secure a supply of honey. The damage is unsightly, and causes the honey to leak after removal from the hive. The special advantage of the Hodgson escape is that, being constructed of wire gauze, the heat from the brood-chamber is not shut off from the super after the bees have escaped. Thus the honey in the super is kept warm, and the drips of honey from the burr combs are cleaned up by the bees.

Control of Bees.

When inserting the Hodgson escape, the super should be gently prized up from the brood-chamber and the escape placed in position. A puff of smoke will suffice to control the bees while the operation is being performed. If this is done late in the afternoon, the bees will pass through the escape during the night to the brood-nest, and will be unable to return. In the morning the supers may be removed, when practically no bees will be left in the super.

A word of caution to those who have not formerly used the escapes: Should there be brood in the super combs, the bees will not leave, and the escapes will not prove effective in ridding the supers. Over and over again many beginners complain that they cannot get the bees to leave the supers when using escapes, but the reason lies in the fact that no examination had been made to ascertain beforehand whether the super contained honey only.

Uniting Weak Colonies.

Among the autumn work to be attended to is the examination of the colonies for the purpose of ascertaining if each possesses a laying queen, and to note those that are too weak to survive the winter. In the negative, in either case, it is advisable to unite with a stronger colony, so as to save the bees. On no account should an attempt be made to winter weak hives, as they are likely to get robbed out, and this may cause the bees to start robbing when everything in the apiary should be quiet.

A simple method of uniting may be practised by placing the weaker hive on top of a stronger one, and putting a sheet of newspaper between the two hive-bodies. In the course of a few days the bees of the weaker colony will make their way through the paper and unite peaceably with the bees in the stronger hive. The surplus combs may subsequently be removed and reserved for spring feeding, if required. It is advantageous to destroy the queen in the weak hive prior to uniting.

Prevention against Robbing.

At the close of the honey-flow the beekeeper must persistently guard against robbing. Robbing is the result of carelessness, and once it has started is exceedingly hard to check. As previously mentioned, neither honey, sugar-syrup, nor anything that the bees can rob should be exposed. In case wet combs have to be returned to the hives for the bees to clean up, postpone this operation until late in the day, when robbing is not likely to start. See that the honey-house is beeproof, and that all combs and vessels containing honey are removed to a place of safety. Contract all hive-entrances, and especially guard against hives being open in such a way that they can be attacked by robbers. All operations must be carried out quickly. If robbing has started, it is better to postpone all outside work until the apiary is quiet again than to risk extending the trouble by opening the hives. Should a colony be attacked, contract the entrance and pile wet grass in front of the hive. This will usually cure mild cases of robbing; but where a colony has been overpowered by the robbers, it should be closed altogether.

—E. A. Earp, Senior Apiary Instructor.

DEPARTMENT OF AGRICULTURE.

WALLACEVILLE POULTRY STATION.

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WHITE LEGHORN

AND

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Orders being booked for Breeding Stock.

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Poultry-keeping Section.

Culling.

WHEN applied to a laying flock, culling means the separating from the flock and the disposal of non-layers, together with such birds as are not likely to produce sufficient eggs to pay for their keep and that do not return to their owner adequate reward for the care and attention given.

All poultry-keepers should learn all they can, and practise the art of culling, for unless they do so they are not likely to get the best returns for their labour. It is not a difficult matter to pick out the very poor birds amongst the best birds, but to thoroughly master the art of culling and correctly weigh up the various points means long experience, much practice, and keen observation.

The poultry organizations would be doing an extra service and one that would be much appreciated, especially by the beginners, if they could arrange for experienced members in the various districts to give practical demonstrations at this time of the year on the subject of culling the laying flock.

As this Department is anxious to see that poultry-keepers do well and that the standard of the Dominion's flocks is maintained, its Instructors would be pleased, where possible, to assist organizations in such work, if they so desire.

To the successful poultry-keepers culling may be said to be almost a constant job, for experience has taught them that the most economical way of keeping flocks on a paying basis is to be always on the watch and by close observation detect and, as soon as possible, dispose of those birds which have passed the period of their usefulness. It is not uncommon for the keen poultry-keeper to cull up to one-third of his flock each year, and it is this systematic culling that has enabled such people to build up good reputations for keeping high-quality stock. However, in order to practise a regular system of culling successfully throughout the year a person requires keen observation and much experience. Though many poultry-keepers are not in the position to adopt a regular system of culling throughout the year, it is a good plan to systematically handle and examine all birds at least once a year. The best time to do this work is just before the birds go into the moult.

Which Birds to Cull.

It is safe to say that most birds two years and a half old or over should be culled as soon as they stop laying. However, if some of the 2½-year-olds are of exceptionally good type, vigour, and constitution, they should be retained for the breeding-pen as long as they retain their vigour and produce fertile eggs.

Fig. 1.—A fine specimen of utility White Leghorn.

As a rule birds that commence to moult before the first week in February can be culled, but it should be remembered that it is not wise to apply this test too strictly to birds that have been mismanaged in any way, or to those that have been moved from other pens recently. Allowance must also be made for the age of the birds, for, generally speaking, eighteen-months-old hens will usually moult a little earlier than older birds.

The poorer birds, or non-producers, will usually possess most or some of the following characteristics: Comb, small or shrunken, cold and more-or-less hard; eyes small, sunken, and listless; pelvic bones thick, stiff, with less than two fingers' width apart; vent dry and small and puckered; abdomen shallow, with less than three fingers' width between the pelvis and breast or keel bones. At times some birds of the heavy breeds may show depth of abdomen, but the texture, with poor producers, will generally be found, on handling, to be coarse, with a layer of fat beneath the skin. If overfat, Leghorns and other yellow-legged breeds can usually be picked by their yellow legs and beaks at this time of the year. However, allowance must be made for any birds of the yellow-legged heavy varieties, if they have been broody, for the colour will usually return to the beak and legs when a bird is sitting.

Figure 1 shows a fine specimen of a utility White Leghorn, a real profit-maker, and one that possesses all the visible characteristics of a good-breeding bird. The body is wedge-shaped, has plenty of size, length, depth, and width,

that is carried through to the tail. The front is full and square, which is a point that is being lost sight of by some of our utility breeders. The head is strong, broad, well balanced, yet not coarse. The beak is strong and nicely curved. Eyes large, bright, full, and prominent. Face fine in texture, free from feathers, and red. Legs set well apart, bone flat, with small neat scales. Feathering is tight and dense. Wings carried well up, and close to the body. Abdomen deep, with texture soft and pliable. The general appearance of the bird is active, full of vigour, and strength.

Figure 2 was taken on the same date. This bird also proved a good layer, but, judging by the loose feathering, low-carried wings, and lack of squareness of front, it is safe to say that it does not possess the vigour and constitution of No. 1. It appears tired, as if it had laid at the expense of the body, and that the strain of great egg-production has been rather too much for it. Such birds if placed in the breeding-pen are not likely to produce strong, vigorous, disease-resisting stock, as would be expected from a bird such as No. 1, which finished up a heavy laying season full of vitality and energy.

Order early.

Those poultry-keepers who intend purchasing some fresh blood for the coming season in the way of breeding hens or cockerels would be wise to place their orders early in order that they may get a good choice and not be disappointed.

—C. J. C. Cursen (Chief Poultry Instructor), Wellington.

Fig. 2.—The type of bird to be avoided when selecting for the breeding-pen.

Trouble with the Brooder.

For several years past, about this time of the year, especially since the introduction of mass-production methods of chicken-rearing and the use of the large canopy brooders where four and five hundred chickens are reared in one lot, a number of poultry-keepers have had a trouble amongst their chickens known as "green-leg," or "green-wing." The first symptoms of this trouble are generally a swelling of the head or back of the neck, and on examination it will be found that the neck-joints are swollen and discoloured, with the joints of the wings also often affected. When the neck and head are badly affected the chicken has difficulty in breathing, and death often follows. The trouble is really caused by incorrect night conditions, overcrowding, and insufficient ventilation, thus causing many chickens to rebreathe the same impure air. Like many other chicken ailments, this trouble is much easier to prevent than to cure. The best means of preventing the trouble is not to overcrowd and to provide plenty of good, dry bedding-material; in fact, it is advisable to place some fresh, dry bedding-material under the hover each night after the chicks are three weeks old.

Where the frame is used to brood chicks on, as recommended in this Department's Bulletin No. 66, "Utility Poultry-keeping," the frame is 7 ft. square, made of 3 in. by 2 in. timber, with ¾ in.- or 1 in.-mesh wire-netting stretched tightly over the top. The wire-netting is covered with pieces of single sacking tightly stretched, and the bedding-material is placed on the sacking. It is well to raise it an inch or two off the ground after the chickens are a little over three weeks old, as this allows the air to get underneath the chickens, and so helps to avoid trouble. Where the frame is not used, extra care should be taken to see that plenty of fresh bedding-material is used.

Overcrowding is one of the chief causes of trouble amongst artificially reared chickens. The writer has seen four or five hundred chickens successfully reared under one brooder, but they have been handled by experienced poultry-keepers. The beginner would be wise to place not more than half that number under each canopy brooder, and in most cases thereby obtain much more satisfactory results. Everything should be done to avoid overcrowding and anything that is likely to create a moist atmosphere. A careful watch should be kept on the chickens just as they are camping for the night to see that they do not crowd. The cockrels should be picked out as soon as they can be detected, as this allows extra room for the pullets. It is also wise to encourage the chickens to perch as soon as they are fit to leave the brooder. Leghorn chickens should, if well brooded, be ready for perching at between six and seven weeks old, but care should be taken to see that they are gradually hardened off.

—C. J. C. Cursen, Chief Poultry Instructor, Wellington.

N.Z. Federation of Young Farmers' Clubs.

Edited by S. Freeman, Dominion Organizing Secretary.

New Zealand Team: Departure for Australia.

The Y.F.C. Team touring Australia.

Seated: Left, A. Viles (winner of the Clydesdale Section, Stock-judging Competition at Royal Show); middle, C. M. Whatman (leader of the team); right, H. McKenzie (winner Jersey Cattle Section).

Standing: Left, A. Fisher (winner Romney Sheep Section); right, A. Cowan (winner Bacon Pig Section).

THE team of five Young Farmers' Club members whose photos appear on this page left Wellington by the s.s. "Awatea" for Sydney at 5 p.m. on Tuesday, 8th February. The lads were in great spirits and looking keenly forward to a wonderful trip. They were farewelled at the boatside by numerous friends and relatives; the bright blue Y.F.C. blazers made it an easy task to pick out the members from among the crowds lining the decks of the "Awatea" as she left Queen's Wharf on her quick journey across the Tasman. Among those gathered to wish the lads *bon voyage* were Mr. W. F. McLaren (Dominion Y.F.C. President), Mrs. McLaren, and Miss McLaren, also Mr. S. Freeman (Organizing Secretary), and Mrs. Freeman.

The members of the touring team were accorded an official "send-off" in the Minister of Agriculture's Office, Parliament Buildings, at 2.30 p.m. The Minister of Agriculture, the Hon. W. Lee Martin, was unable to be present owing to indisposition, but the Hon. F. Jones, Postmaster-General, acted in his place and farewelled the team. The function was broadcast from 2YA, and a recording was put over the air again at 7.30 p.m.

The Organizing Secretary explained the objects of the Y.F.C. movement in New Zealand for the benefit of listeners over the air. In introducing the members of the team to the Minister, the Dominion President, Mr. McLaren, spoke of the excellent work being done by the organization and related some of its most important achievements, including the stock-judging competitions at the Royal Show, Palmerston North. He spoke of the tour of Australia that the lads were embarking on as "a milestone in the progress of the organization." He asked the Hon. Mr. F. Jones to thank the Hon. Mr. Lee Martin for the kindly thought that had inspired the "send-off," and also to convey to him the federation's appreciation of the work that had been carried out for the Y.F.C. movement by the officers of the Department of Agriculture. He also paid a tribute to the assistance given to the organization of kindred farming bodies such as the N.Z. Farmers' Union, A. and P. Association, and the like. Other speakers included Mr. R. B. Tennent, Director of the Fields Division, Department of Agriculture, and Mr. A. P. O'Shea, Dominion Secretary, N.Z. Farmers' Union. The Minister commented on the valuable work being carried out by the Y.F.C. organization, and commended the undertaking that had resulted in the Australian tour. He congratulated the members of the team and wished them, on behalf of the Government, a pleasant voyage, an interesting and instructive tour, and a safe return. The members of the party, Messrs. C. M. Whatman (leader), A. Fisher, H. McKenzie, A. Viles, and A. Cowan, replied individually and thanked the Minister for his good wishes. They, one and all, expressed the keenness with which they were looking forward to the tour, their gratitude for the co-operation of their fellow-members who had made the trip possible, and their realization of the educational value of the tour.

The members of the team are well equipped with cameras, and will be keeping diaries with the idea of writing up their experiences while in Australia. They will be sending news from time to time throughout the tour, so that members may look forward to hearing something of their doings in these pages in the next issue of the *Journal*.

Sydney Comment.

APROPOS of the Australian tour, the following has been culled from the *Sydney Morning Herald*, of 5th January last :—

"A marked step in developing the fellowship of young farmers of the Empire has taken place in the acceptance by junior farmer movements in England, Scotland, Ireland, Wales, and New Zealand of an invitation to send representatives to Australia this year. Canadian clubs declined the invitation, and the organization in South Africa is as yet only in its infancy.

"Extensive tours of country districts have been arranged by the Junior Farmers Club Council of New South Wales, which body was responsible for the innovation to further the idea of reciprocal visits visualized after the tour of the United Kingdom last year by a party of three Australian boys. The council will discuss in February the possibility of visits by an Australian team to New Zealand and the United Kingdom in alternate years.

"After becoming acquainted with rural practice and the character of the work undertaken by junior farmers here the visitors will join the junior farmers' camp at the Royal Easter Show on 10th April. Owing to the difficulty of drawing up rules of a competition giving all teams an equal chance of success, an Empire Competition will not be held, but the Royal Agricultural Society will allow any of the lads to enter the students' judging contests.

"The party will comprise nine members, four from the United Kingdom and five from New Zealand."

Club Work Overseas.

AN extract from an English paper may be of interest to New Zealand Y.F.C. members :—

"Members of the Shropshire Federation of Young Farmers' Clubs showed their skill in no uncertain manner at the annual ploughing, hedging, and milking competitions, organized by the Shropshire Federation, at Haygate Farm, by permission of Mr. R. E. Bebb, on Thursday, 14th October. Their skill was shown in directions other than the competitions mentioned, for there were open hunter trials, sheep-dog trials, beet-lifting and topping, and the usual inter-club tug-of-war, together with clay-pigeon shooting.

"The sheep-dog trials and the beet-lifting and topping competitions were new features and proved highly successful."

The New Y.F.C. Constitution.

AT the Dominion Executive Meeting held in Christchurch in December, a report was received from the sub-committee appointed at the annual meeting (July last) to deal with the proposed alterations to the constitution. The sub-committee (Messrs. W. F. McLaren, A. C. Cameron, Alan Grant, A. Hudson, J. B. Chrystall, C. J. Hamblyn, and S. Freeman) had met that morning and discussed the opinions submitted by the various District Committees. As a result the sub-committee brought down recommendations which agreed with the original proposals in so far as affirming the principle of greater proportionate representation on all committees, &c., by Y.F.C. members. The value of representation by kindred organizations and educational bodies was fully recognized and provision made in that direction. Instead of the entire abolition of the two Island Councils as suggested, it was recommended that four Councils should be set up, two in each Island, delegates from these Councils to constitute the Executive Committee ; it was considered that fuller and more representative meetings would be ensured by this means.

The report was discussed and the recommendations received with general approval. The new constitution is at present being drafted and will be brought forward at an early date before a general meeting for consideration, following the usual procedure of Notice of Motion.

Making of Ensilage.

P. G. and R. H. Thevenard, Members of the Kimbolton Y.F.C.

(Note.—*This is the first of a series of articles written by Y.F.C. members for publication in this section of the Journal of Agriculture. The article is a record of the writers' own opinions and experiences, and criticism by other Y.F.C. members is invited. Members are urged to send in their own articles for publication, in order that these pages may become truly a Young Farmers' Club section.*)

THE practice of storing green material in the form of ensilage is now well known throughout the Dominion.

Ensilage-making enables the farmer to store the surplus grass in its most succulent and palatable condition for supplementary feeding in the winter and spring, when there is little or no pasture growth, and in drought periods.

The making of ensilage does not improve the food value of the material from which it is made, but does make it more palatable. For example, thistles and rank grass will not make a more nutritious food by being ensiled, but will have become softer and also will be fed at a time when the stock are more likely to eat them.

From this it is easy to see that young grass, cut when it is from 8 in. to 12 in. high, will make the best ensilage.

This early cutting and storing of the surplus grass not only makes the best silage, but also does not check the pastures as much as a cut of hay ; the paddock need not be closed for so long, and the pasture has time to recover before the summer, or may provide another cut of ensilage.

The paddocks should be harrowed and given a dressing of 2 cwt. or 3 cwt. of superphosphate before being closed for silage—this ensures a quick growth of leafy grass and a better aftermath. In a good spring a paddock should be ready for cutting in from three to four weeks after closing.

Although young grass makes the best material for ensilage, other crops such as oats and tares, Italian rye and red clover, millet and maize are very suitable and provide a heavy bulk of feed, while only occupying the ground for a short period. The time to cut these crops varies with the different types ; the oats should be cut just before the heads break out, and they will come away again either for a hay cut or for grazing ; the rye and red clover should be cut when there is the most bulk of leaf before it becomes too coarse, usually just when flowering is commencing. The maize and millet should not be cut before flowering, and are best when the ripening stage has begun.

Farmers possessing a stand of lucerne will not be troubled by droughts, but they will find it very convenient to make

their first cut into ensilage. As this crop comes away just when there is a flush of grass in the spring and the weather prohibits haymaking, ensilaging disposes of the first cut; the following cuts can be made into hay or fed out green in dry weather and autumn.

Methods of making Ensilage.

First, the plain circular stack built on the ground. This is the simplest and cheapest, and should be built on a well-drained spot where it is convenient for both bringing in and feeding out. There should be *no* stack bottom or logs underneath, as this only lets in air, which causes rotting.

The stack should be built with the sides vertical and the centre always a little higher than the outside edge, and the whole well tramped to exclude the air. The stacker should walk well on the edge of the stack, as it is essential that the sides should be firm.

The size of the stack will depend on the amount to be put in, but should be large enough to allow, say, a quarter of the paddock to be cut and make a stack of from 6 ft. to 8 ft. high in one day. This should be left over the second day to generate heat, and then on the third day another quarter should be put in, which, with sinking, will build the stack up again to about 8 ft. or 9 ft.; the rest of the material should then be put on without pause. If a strong wind blows the heat through the stack and makes settling onesided, it is a good idea to hang a tarpaulin on the windward side.

The second method is the digging of a trench in the middle of a paddock or between two paddocks, large enough to take a tumbler sweep. The trench should be about 6 ft. deep in the centre and sloped up to each end. The material is swept in, and the horses pull the sweeps right through the trench, depositing the load in place and trampling the material at the same time.

Fig. 1.—Stacking a crop of oats for silage. The paddock of 5 acres was cut in three sections. The photo shows stacking operations on the third day. This stack is 18 ft. in diameter. The three operators are well-known members of the Kimbolton Young Farmers' Club.

The third method is the pit silo. A bank is necessary, so that the material can be put in from above and carted out from below, thus saving labour. The pit is dug in the side of the bank, and should have sloping sides to overcome the rotting caused by shrinkage as the material sinks. The walls can be timbered or concreted, but this is not necessary if the soil is firm and not likely to fall in. When stacking in the pit, the centre must be kept higher than the sides, to make the material splay out and keep the sides against the walls, to exclude air, which causes rotting.

The last type is the moveable concrete or wooden silo built in sections; this has an advantage over the pit, as it can be used in a new place each year if need be.

For producing a better ensilage, especially where the material is inclined to be stalky and dry, molasses, skim-milk, or whey are very helpful. These start the fermentation of the best type containing lactic acid, and produce a sweeter and cooler ensilage. The molasses should be broken down with water at the rate of 3 lb. to a gallon of water. Skim-milk and whey, where available, are better, and, of course, cheaper. They may be sprinkled on with a watering-can as the stack goes up.

For stacking ensilage, the use of a mechanical stacker is better than pitching, as, the green material being very heavy, it takes a great deal of labour; the stacker also dumps the load in the middle of the stack, making easier building.

For collecting the material, light tumbler sweeps are ideal, as it can be picked up out of the swath and dumped at the stack or in the trench with a minimum of labour. Carts and sledges

Fig. 2.—A silage pit built on the edge of a 10 ft. bank. The pit is 15 ft. in diameter, and was filled from a 6 acre grass-paddock. There is 6 ft. of material in the pit and 4 ft. out.

can be used, but these mean double handling, which increases costs.

When the stack or pit is finished it should be covered, as the rain in the top causes waste, and also the sides need weighting.

The best seal is made by 12 in. or 18in. of earth brought right to the edge of the stack. The earth may be held on with a bag of wire-netting or short lengths of planks tied round the edge. If a stacker is used, the earth can be hoisted up in a box or can, in place of the grab.

When opening up the ensilage for feeding out, take the whole top off and work right down, as cutting will only leave a face for the air to get in and start it decomposing. As silage decomposes readily on exposure to air, enough should be fed out for one day and the stock should not be fed on old stuff.

Ensilage is mainly used by dairy-farmers, but good results are obtained by feeding it to sheep. To get them to take it, feed it mixed with hay, gradually lessening the amount of hay, and making sure that the silage is fresh every day.

Ensilage fed to cows before calving will bring them in in better condition, freer from calving troubles and attendant diseases, and will bring them to their flush earlier.

For young stock ensilage is ideal, as it contains vitamin A, the growth factor, and, literally speaking, provides them with spring grass in the winter.

Summing up, we find that ensilage gives better pastures control and better-fed stock, therefore better returns. It can be made in almost any weather, and is comparatively simple to make.

Among the Clubs: Reports on Activities.

THE majority of the clubs in the South Island are at present in recess owing to the demands of seasonal work; on this account there are only two reports of meetings from South Island clubs, as follows:—

Canterbury.

Ladbrooks.—Arrangements finalized for debate. Cinematograph film, "Caterpillar Tractors," exhibited by Messrs. Gough, Gough, and Hamer. At the previous meeting the club members who took part gave accounts of the stock-judging competitions at the Royal Show, Palmerston North. There were also two-minute talks on various subjects by other members.

Oxford.—Lectures on the "Rules of the Road" and the "Causes of Road Accidents" by the following speakers: Mr. Hawkes (Canterbury A.A.), Mr. Rennie (Assistant Chief Traffic Inspector, Christchurch), and Mr. Clark (of the Highways Board).

While a number of North Island Clubs did not meet owing to seasonal activities, reports have been received from the following:—

Manawatu.

Levin.—Decided to visit Mr. R. J. Law's property for a field-day on Romney sheep. Messrs. W. E. Kilsby and J. Taylor gave interesting accounts of their recent trip abroad.

Otaki–Te Horo.—Lecture by Mr. A. C. Holmes, B.Sc., on "The Chemical Side of Artificial Manures." At the previous meeting Mr. G. S. Robinson, Department of Agriculture, gave a talk on "Dips and Dipping."

Paraparaumu.—Impromptu talks by members as follows: "The Care of the Working Horse" (W. Hardham); "What is the most Profitable Breed of Cow?" (H. Baucke); "Which pays best—Butter or Cheese?" (H. Rentoul); "Does Winter Milking Pay?" (A. Howell); "Tractor *v.* Horse" (G. White). At the previous meeting Mr. E. T. Taylor, Department of Agriculture, Wellington, gave a lecture entitled "The Orchard."

Manawatu Y.F.C. District Committee.

From left—Seated: J. Gloyn (Rongotea), A. J. Galpin, Department of Agriculture (District Y.F.C. Secretary), H. J. Lancaster (District Chairman), A. Lawson (Kimbolton), E. W. Barnett (Halcombe), C. J. Hamblyn (Fields Superintendent, Department of Agriculture), N. P. Neilson (Kairanga), J. B. Chrystall (Kairanga), M. C. Holmes (Otaki). *Standing:* J. Cowan (Apiti), K. W. R. Mitchell (Woodville), P. Thevenard (Kimbolton), C. Spence (Apiti), F. Sherwood (Department of Agriculture), E. Blatchford (Woodville), G. S. Robinson (Department of Agriculture).

Pohangina Valley.—Lantern lecture by Mr. Gorman, of the Plant Research Bureau, on "Strains of Pasture Plants and Grass-seed Certification." At a previous meeting Mr. H. R. Denize, Department of Agriculture, gave a lantern lecture on "Animal Husbandry."

Rangiotu.—Lecture by Mr. C. J. Hamblyn, Department of Agriculture, on "Rotational Grazing."

Woodville.—Mr. K. W. R. Mitchell, a club member, gave a very instructive lecture on the "History of the Southdown." At a previous meeting, lecture by Mr. G. S. Robinson, Department of Agriculture, on "Dips and Dipping."

Wanganui District.

Bulls.—Visit by club members to Wanganui; inspection of woollen-mills, Imlay Freezing-works, and K.P. Fertilizer Works. At the last meeting a debate was held, "Horse *v.* Tractor," resulting in a win for the tractor supporters.

Taranaki.

Alton.—Lectures, "Life-Saving" by Mr. E. Oakley, and "The Coronation" by Captain R. W. Haddow.

Pukengahu.—Lecture by Mr. Leslie (Veterinary Surgeon) on "Horse Troubles."

Wairarapa.

Carterton.—Arrangements for dance to entertain Messrs. A. Fisher and H. McKenzie, winners of Sheep and Cattle Judging at Royal Show. Three-minute speeches by members as follows: "Pampas-grass" (E. Hart); "Lucerne-growing" (L. Renall). Lecture by Mr. A. Ross on "The Functions of a County Council."

Mangatainoka.—Talk by Mr. A. Webb on "Mammitis."

Masterton.—Talk by K. McGillivray (club member) on "Care of Hoggets in Autumn and Winter." Lecture by Mr. W. J. Gray, Government Veterinarian, on "Bacteria and Disease."

Hawke's Bay.

Dannevirke.—Address by Mr. C. Thom, of Weber, on the "Training of Sheep Dogs." Lectures at the previous meeting were given by Messrs. J. W. Palmer and I. L. Elliott, of the Department of Agriculture, on the "Control of Summer Growth of Pasture" and "Soil Survey" respectively.

Meeanee.—Business meeting: Finance, &c.; insurance on hall; arrangements finalized for visit by Wairoa Y.F.C. members.

Norsewood.—Lecture by Mr. C. J. Hamblyn, Department of Agriculture, on "Certification of Farm Seeds."

Onga Onga.—Impromptu discussions and debate; arrangements *re* field-day.

Poverty Bay.

Gisborne.—Debate, the subject being "That Heredity Wields a Greater Influence than Environment." The speakers were as follows: Messrs. H. G. Cooper, R. H. Nelson, and K. W. Cooper (for the affirmative), and Messrs. R. Pilmer, R. Richardson, and N. L. Cooper (for the negative.) The adjudicator, Mr. R. Briant, gave his verdict in favour of the supporters of the affirmative.

Nuhaka.—Lecture by Mr. F. Marden, on "The Raising of Fat Lambs." At the previous meeting Mr. D. Clarkson read a paper on "Lung-worm in Sheep," and Mr. Eric Powdrell gave a lecture on "Wool, including Preparation for the Sales and the Processes of Manufacture."

Ruatoria.—Lectures as follows: "A Standard to be Aimed at among Young Farmers," and "Management of Cattle and Sheep" (Mr. G. V. Smith); "Station Book-keeping" (Mr. E. Bear).

Te Karaka.—Short talks by competitors at Royal Show Judging Competition (K. W. Cooper, J. Bayley, and A. Manuel).

Tolaga Bay.—Lecture, "Facial Eczema in Sheep," by Mr. H. Irving; paper by Mr. M. Robieson, "Sheep-dipping." At the previous meeting a debate was held, the subject being "Hay *v.* Ensilage."

Wairoa.—Lecture by Mr. E. M. Bates, Department of Agriculture, on "Subterranean Clover." Prepared speeches by club members, being part of a series entitled "The Life of any Man who has Benefited the Farming Community"; "Sir Apirana Ngata" (W. T. Powdrell); "W. D. Lysnar" (E. S. Pattison); "Sir George Gray" (Mr. T. Byrne).

Te Kuiti.

Aria.—Debate "Cropping *v.* All-grass Farming"; Messrs. J. Davidson, E. Budd, and H. McIndoe took the side of "Cropping," and Messrs. L. Frederick, D. Thomson, and K. Brown supported the "All-grass Farming."

Otorohanga.—Lecture by Mr. H. Lawrence, "How to Conduct a Meeting." A field-day was held on Mr. Henderson's property, Kio Kio; Mr. K. Montgomery, Department of Agriculture, conducted the members over the strain and species trials (grass and clover) and manurial plots. Arrangements are in train for a stock-judging competition.

Te Anga.—Visit to New Zealand Co-operative Dairy Co.'s butter-factory at Otorohanga; members were conducted over the factory by the manager, Mr. L. V. Landman. A visit was also paid to Nelson's Apiary, Otorohanga, Mr. Nelson giving a lecture and demonstration on honey extraction, &c.

Bay of Plenty.

Katikati.—Mr. C. Hume continued his lecture on "Pigs"; he spoke on to-day's market requirements, and compared New Zealand's pig-production with that of other countries.

Opotiki.—Business meeting: Arrangements for a debate and field-day.

Waimana.—Business meeting: Discussion *re* debating competition.

North Auckland.

Marohemo–Maungaturoto.—Lecture on haymaking, by Mr. E. H. Arnold, Department of Agriculture.

Increasing the Club Membership.

THE following has been received from the District Y.F.C. Secretary, Dunedin:—

"Although club activities are at a standstill at the present time it is hoped that members are endeavouring to make as many contacts as possible with other young farmers in their districts, with a view to increasing the membership of their clubs. It is not sufficient to sit back and wait for new members to turn up. In order to increase the membership of young farmers' clubs, or any other such organization, a considerable amount of canvassing is necessary. In some districts there is the feeling that there are no more eligible young farmers, but if a systematic canvass was made by all members, and not just the chairman and secretary, a considerable increase in membership would almost certainly result. Any increase in membership depends very largely on the present members. There are doubtless many young farmers who would be only too pleased to join if present members discussed the movement and its advantages with them. Some young farmers have only a vague idea of the objects and functions of the movement, and are not likely to realize its advantages until these are pointed out by some active member."

Y.F.C. "Blazers."

THE attention of members is drawn to the fact that Y.F.C. blazers have been designed and are being worn by the members of the Y.F.C. team now touring Australia. These blazers are now available to all members who wish to procure them. They are royal blue in colour, with gilt buttons, and the Y.F.C. badge is worked in yellow on the pocket. Members are urged to give publicity to their organization by obtaining and wearing these blazers, which are of particularly smart appearance, the material and workmanship being of the best. They are being manufactured at wholesale rates for the federation and will be supplied at cost to members. Members should apply to their club secretaries, who will give them full details regarding cost, self-measurement chart, &c. Do not neglect this opportunity to secure a really cheap, serviceable, and distinctive garment, and at the same time advertise your organization.

Health Notes for the Farm.

Contributed by the Department of Health.

Milk for School-children.

The Hygiene Aspect.

IT is the aim of the Government to make available to all school-children in the Dominion a ½ pint ration of milk each school day. The first distribution of milk under this national scheme took place on the 1st March, 1937, when some twenty-seven thousand children participated, and since that date this ration has been made available to one hundred and fifty thousand, representing over 50 per cent. of the school population. Apart from the definite health value of this scheme, it has an important economic aspect. Thus, when it is fully functioning over 3,000,000 gallons of milk that would otherwise be used for manufacture of cheese and butter will be used as whole milk. The rapid advancement of the scheme can be attributed in no small measure to the assistance given to the Department of Health by the Departments of Agriculture and Education, and by local committees.

It was decided to provide a pasteurized milk in a sterilized bottle, complete with special cap, and a straw to assist in the quiet assimilation of the milk. Applications have been received for raw-milk schemes quoted by local committees as being from sources the acme of cleanliness, but the decision to use pasteurized milk wherever practicable has been further substantiated by the findings of a recent League of Nations Research Committee set up to investigate the various aspects of the milk problem. For information of those producers with a haphazard conception of reliable standards of clean production, the following excerpt dealing with the hygienic aspects of the milk problem from this report is well worth quoting.

The playtime drink. ["*Dominion*" *photo.*

"Clean" and "Safe."

"During the subsequent pages, we shall frequently have occasion to use the term 'clean' and 'safe' in relation to milk. It may be as well to define at once what we mean by these terms.

"By 'cleanliness' is generally understood the freedom of the milk from extraneous matter, such as manure and dust, from blood, and from an undue number of leucocytes and bacteria. It is an unsatisfactory term, and refers to contamination of different types. It fails to distinguish between an initially dirty milk and a milk which, though produced under good conditions, nevertheless contains large number of bacteria as the result of imperfect cooling. If the term is used in special relation to bacterial contamination, rather than to contamination with gross dirt, pus, or blood, it may be suitably qualified, and the term 'bacterial cleanliness' employed.

"By 'safety' is meant the freedom of the milk from bacteria capable of giving rise to disease in man or animals.

"'Cleanliness' and 'safety' in milk are entirely different properties, and it is well to make this clear from the outset. A clean milk may be dangerous, and a dirty milk may be safe. Several outbreaks of disease in Europe and the United States have been traced to milk produced under exceptionally clean conditions. Two of the most striking recent instances are the Brighton-Hove outbreak of septic sore throat in 1929, and the Chilgrove outbreak of scarlet-fever in 1934. In both instances the incriminated milk-supply was derived from farms where the greatest attention was paid to cleanliness. The producer of the the Chilgrove milk had actually won the cup in the county clean-milk competition.

Diseases in Milk.

"The reason for the dissociation of cleanliness from safety is not far to seek. The organisms responsible for dirty milk come mainly from unsterilized milk utensils, mud and manure on the cow's udder, and dirt on the hands of the milker. On the other hand, the organisms responsible for dangerous milk come sometimes from the diseased udder of the cow, sometimes from human cases or carriers of infectious diseases, and sometimes from a contaminated water-supply. Milk may be produced under the most cleanly conditions, the udders may be groomed, the milker's hands may be washed, all utensils may be sterilized by steam, and the resulting milk may contain only a very small number of bacteria; yet if the udder of one of the cows is diseased, or the milker is a carrier of hæmolytic streptococci or enteric bacilli, or the water used on the premises is infected with typhoid bacilli, then pathogenic organisms may gain access to the milk, and the most serious consequences may follow.

"Not only are the organisms responsible for dirty milk qualitatively different from those responsible for dangerous milk, but there seems to be in fact some degree of antagonism between the two groups—that is to say, the presence of saprophytic organisms. Put it another way, pathogenic organisms have a better chance of survival in clean than in dirty milk."

It is obvious that a food so valuable as milk deserves all the care that can be bestowed upon it, especially as from the very nature of its composition it is particularly fitted to be a breeding-ground for organisms. The germs of disease get into milk so easily that some reliable way to purify the milk is essential. The scientist Pasteur, who saw the need of an easy check and reliable way to destroy these germs, discovered the process now known as pasteurization. Pasteurization does not make poor milk rich or dirty milk clean; its only object is to destroy injurious germs. The Chief Medical Officer of the Ministry of Health, England, in his latest report on the "State of the Public Health," states: "Evidence that there is no significant difference in the nutritive value between raw and pasteurized milk continues to accumulate. The results of three recent investigations (given in the report) provide impressive evidence of this, and in addition demonstrate the immense advantage which pasteurization confers in preventing the occurrence of tuberculosis from the consumption of tuberculous milk. During the year there were three extensive outbreaks of enteric fever, enteritis, and scarlet-fever, respectively, in which the vehicle of infection was raw milk."

Artificial Respiration.

SWIMMING is one of the best forms of exercise. It stimulates the whole body, induces deep-breathing, and in general is beneficial to health. It is thoroughly enjoyable in itself. During midsummer no better way of spending the hot hours of the day can be advised than by devoting them to bathing and to learning the art of swimming. Not only as a form of physical exercise and a means to maintain healthy growth and vitality of the human body is swimming invaluable, but as a means of saving life. It should be the aim of persons therefore to learn to swim, and if opportunity occurs to belong to a life-saving club.

The importance of knowing how to give artificial respiration cannot be over-emphasized. Often when a person apparently drowned is taken from the water, breathing has stopped. But let this fact serve only to spur one even to quicker action. Send or call for a doctor at once. Then start to work. Remember that what is done in the first seven minutes is what counts most. Place the person on his abdomen with one of his hands extended straight above his head. Put his other hand under his forehead and turn his head slightly to one side. Remove any foreign material from his mouth. Get some one, if possible, to rub his arms and legs and do what you can to keep his body warm. Straddle his body between your knees, lean forward and place your hands on the small of his back towards the sides of his body. Let the little finger of each of your hands rest on the lower rib. Press downwards. This compresses the lung upwards. Now release your pressure. This allows the lung to expand and the air to rush in. Repeat this operation at the rate of fifteen times a minute. Do not stop, do not give up. If you tire, get some one to relieve you. Keep in mind that many persons apparently no longer alive have been brought back to consciousness after they have been worked over for several hours. No not remove the patient from the spot until he is breathing normally. Then warm him up with blankets and hot-water bags. Do not give any fluid by the mouth to an unconscious patient. When he is conscious he may be given hot, strong coffee.

Remember.—Even if you know how to swim do not be foolhardy and take unusual risks.

(1) Do not swim immediately after a hearty meal.

(2) Do not swim when overheated.

(3) Do not let yourself get chilled in water that is too cold.

(4) Do not stay in the water to the point of feeling fatigued.

(5) Do not swim in dangerous places.

(6) Do not dive into waters of unknown depths.

(7) Do not fail to keep children under close supervision while they are in the water.

Grassing of Swamp Lands.

E. C. H. (Hamilton):—

I note on page 154 of your *Journal* of 20th September mention is made of a grass "*Phalaris arundinacea.*" As we are trying to bring in some 300 acres of the Rukuhia Swamp, we are anxious to try anything that will hasten it towards a good pasture. I would be glad if you could pass this letter on to any one who might be able to advise as to where we could procure some seed to give the grass a trial.

Fields Division:—

Phalaris arundinacea is a reed-like canary grass which thrives well in damp meadows or round edges of fresh-water swamps. It is considered to be of little value on peat land.

It is doubtful if seed is procurable in New Zealand, but plants can readily be got in the Whangamarino Swamp, at Kopuku.

Founders of Modern Agriculture.

J. W. Woodcock, Fields Division.

Robert Bakewell.

WE are indebted to Robert Bakewell (1725–1795) for the improvement in live-stock breeding which took place towards the latter part of the eighteenth century. He introduced the method of in-and-in breeding, by which, together with a process of systematic selection, he improved the Longhorn cattle and Leicester breed of sheep.

Bakewell began in early life to assist his father in the management of a farm at Dishley, in Leicestershire, and after travelling about the country in order to become well acquainted with different methods of farming and breeds of live-stock he took over his father's business while still quite a young man. He soon turned his attention to the improvement of Longhorn cattle and Leicester sheep, and, while he attained a considerable degree of success with the former, it is as the creator of the New Leicester that he became famous. Bakewell's system of in-and-in breeding was regarded as something of a heresy at that time. His main principles were those of fining down bone, developing thickness of flesh, and producing the latter on the most valuable parts of the sheep. In a comparatively short time he transformed the big, lanky, raw-boned Leicester into a model of symmetry, excellent alike for readiness to fatten and for early maturity. He originated the practice of letting out rams for the season instead of selling them, but it took him twenty years so to convince his neighbours of the soundness of his system that they were willing to pay a ten-guinea fee for the hire of some of his choicest rams. Afterwards the Dishley stock became eagerly sought after from every part of the United Kingdom.

A Leicester ram of nearly 100 years ago.

Bakewell's lavish hospitality, together with his heavy expenditure on breeding and on his various farming experiments, caused his bankruptcy, but this did not cause any break in his breeding career. He was, however, reduced to comparative poverty, in spite of high prices realized for his animals, of which some wit declared "were too dear for any one to buy and too fat for any one to eat."

Although Bakewell never described his methods in writing, he evidently had some ability to impart his knowledge in practical form, since his farm pupils, George and Matthew Cully, later developed the Border Leicester breed by judicious crossing. The Colling brothers, who commenced to improve the Shorthorn cattle, were also influenced by the methods of Bakewell. In fact, Robert Bakewell's influence pervaded the whole range of breeds subsequently, and he raised the status of live-stock breeding to that of a distinct profession, and he brought about the realization that in this profession the "eye of the breeder" is the chief instrument for improvement.

A modern Leicester ram.

(*To be continued.*)

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